CHAPTER 4

ROADWAY DESIGN
AND
TECHNICAL CRITERIA

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CHAPTER 4-ROADWAY DESIGN AND TECHNICAL CRITERIA

4.1 GENERAL

This section sets forth the minimum design and technical criteria and specifications to be used in the preparation of all roadway plans.

4.1.1 Within this chapter on Roadway Design and Technical Criteria, AASHTO "Green Book" refers to "A Policy on Geometric Design of Highways and Streets-1984" as published by the American Association of State Highway and Transportation Officials.

4.2 ROADWAY DESIGN AND TECHNICAL CRITERIA

The Town of Bennett has adopted a Functional Street Classification Plan based on traffic volumes, land use and expected growth. This Functional Street Classification Plan designates streets as local (Types I, II, III & IV) collector (major and minor), arterial (minor 4 lane and 6 lane), rural (Types V,, VI, local and major). The following criteria apply to each classification. Standard roadway cross sections are presented in the Appendix Section of this Manual.

4.2.1 Planning Principles for Local Circulation Systems

Basic considerations in the design of local circulation systems must recognize the following factors:

Safety-for both vehicular and pedestrian traffic
Efficiency of Service-for all users
Livability-especially as affected by traffic elements in the circulation system
Economy-of both construction and use of land

Each of the following principles is an elaboration on one or more of these four factors. The principles are not intended as absolute criteria, since instances may appear where certain principles conflict. The principles should, therefore, be used as guides to proper systems layout.

A. Ensure Vehicular and Pedestrian Access.
The primary function of local streets is to serve abutting properties. Street widths, placement of sidewalks, patterns of streets and number of intersections are related to safe and efficient access to abutting lands.

B. Minimize Through Trips.
Through traffic on local and collector streets increases the average speed and volume and thus the accident potential, thereby reducing residential amenities. Through traffic can be discouraged by creating a circuitous route between neighborhoods and higher volume streets and by channelizing or controlling median crossings along peripheral routes.

C. Control Access to Arterials.
Local circulation Systems and land development patterns should not detract from the efficiency of peripheral arterial facilities. Ideally, land development should occur so that no local streets require direct access to arterial routes. The number of access points between the local circulation system and the arterial system should be minimized. Intersections along arterial routes should be properly spaced for efficient signalization and traffic flow. The streets that do intersect the arterial system will tend to have high volumes since they are the only exit points.

D. Discourage Speeding.
Residential streets should be designed to discourage fast movement (more than 25 m.p.h.), through the use of curvilinear alignments and circuitous routes in the street system.

E. Minimize Pedestrian-Vehicular Conflicts.
Pedestrian travel from within the area to points outside should require a minimum of

street crossings. Sometimes this may be achieved through proper design of street patterns, land use arrangements and pedestrian routes. Typical methods include use of cul-de-sacs and loop streets, special pedestrian routes or walkways and the proper placement of high pedestrian traffic generators. In general,while vehicular flow must be outward oriented to the peripheral arterials, pedestrian travel should be inward oriented to avoid these heavier vehicular flows.

F. **Minimize Space Devoted to Street Use.**
It is desirable to minimize local street mileage to reduce construction and maintenance costs as well as to permit the most economic land use. Streets should also have an appearance commensurate with their function. They should be in keeping with the residential character.

G. **Relate Street to Topography.**
Local Streets will be more attractive and economical if they are constructed to closely adhere to topography. The important role that streets play in the overall storm drainage system can be enhanced by using the topography of the area.

H. **Layout Street to Achieve Optimum Subdivision of Land**
The arrangements of streets should permit economical and practical patterns, shapes and sizes of development parcels. Streets as a function of land use must not unduly hinder the development of land. Distances between streets, number of streets, and related elements all have a bearing on efficient subdivision of an area. Access to adjoining properties should also be encouraged.

4.2.2.1 LOCAL TYPE I

A. Posted Speed Limit-20 mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Traffic volumes will be limited to 250 v.p.d. (25 dwelling units) or less on a Dead End Street (cul-de-sac) unless the Fire District okays 40 D.U.s, or 250 v.p.d. (50 total dwelling units) or less on a loop street where both ends of the loop street enter onto the same through street. This means that the traffic volume cannot exceed appx. 250 v.p.d. at either end of a loop street that has 50 D.U.'s on it, and there will be no chance of "cut-through" traffic traveling on the street. This may be verified by a Traffic Study.

C. Limited Continuity

D. Safety.
Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land.

E. Traffic Control.
Stop signs, yield signs, or right-of-way rules for uncontrolled intersections.

F. Function.
Local streets provide direct access to adjacent property. Traffic carried by local streets should have an origin or a destination within the neighborhood. Utility line easements should be available.

G. Right-Of-Way.
In single-family residential areas: 50 feet minimum. In multiple-family residential areas; 60 feet minimum. Any change in R.O.W.

width due to a change in street classification shall be made at intersections only. An appropriate radius of the R.O.W. will be provided at all intersections to ensure the sight distance triangle falls within the public R.O.W. A sight distance triangle will also be acceptable for the same purpose (with the shorter dimension lying parallel to the centerline of the minor street). R.O.W. radius in cul-de-sac bubble or eyebrow shall be fifty-five (55) feet.

H. Number of Moving Lanes - Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristic.
Local streets should be designed to discourage through traffic from moving through the neighborhood. Local streets should not intersect major collectors or arterial streets. See Chapter 5 of these Regulations for intersection spacing criteria.

K. Type of Curb and Gutter.
Vertical and mountable type permissible with attached sidewalk. Fibermesh shall be required in all driveways.

L. Cul-De-Sacs & Knuckles.
Shall all have a minimum flowline radius of forty-five (45) feet (see drawing no.'s 41,42&43). Cul-de-sacs may have a maximum length of 1,200 feet, or a maximum of 40 dwelling units (if approved by the Fire District), whichever is most restrictive. Cul-de-sacs longer than 600 feet, or with more than 25 dwelling units, may require all units to be sprinkled per NFPA-13D.

M. Sidewalk Width.
   1. Single-family residential: 5' wide combination w/curb.
   2. Multi-family residential: 5' wide combination w/curb.
   3. Suitable configurations with bike paths may be required. (See drawing no.'s 2,3 and 4).

N. Street Widths.
   1. Single-family residential: 32' paved width plus 2-2' gutter pans. (36' flowline-flowline).
   2. Multi-family residential: 40' paved width plus 2-2' gutter pans. (44' flowline-flowline).

O. Minimum Radius of Curvature on Centerline (Horizontal). See Table 4.2.

P. Minimum Length of Vertical Curves.
   See Table 4.6.

Q. Street Grades.
   A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles, and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0% (10% in mountains, by special approval of the Public Works Director). See Table 4.1 and Table 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
   See Table 4.3.

4.2.2.2 LOCAL TYPE II

A. Posted Speed Limit-25 mph.
   Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
   Less than 1,500 vehicles per day.

C. Limited Continuity.

D. Safety.
Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land.

E. Traffic Control.
Stop signs, yield signs, or right-of-way rules for uncontrolled intersections.

F. Function.
Local streets provide direct access to adjacent property. Traffic carried by local streets should have an origin or a destination within the neighborhood. Utility line easements should be available.

G. Right-Of-Way.
In single-family residential areas: 50 feet minimum. In multiple-family residential areas: 60 feet minimum. Any change in R.O.W. width due to a change in street classification shall be made at intersections only. An appropriate radius of the R.O.W. will be provided at all intersections to insure the sight triangle falls within the public R.O.W. A triangle will also be acceptable for the same purpose (with the shorter dimension lying parallel to the centerline of the minor street).

H. Number of Moving Lanes. Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristics.
Local streets should be designed to discourage through traffic from moving through the neighborhood. Local streets should not intersect major collector or

arterial streets. See Chapter 5 of these Regulations for intersection spacing criteria.

K. Type of Curb and Gutter
Vertical and mountable type permissible with attached sidewalk, or mountable curbwalk.

L. Cul-De-Sacs, Knuckles and Eyebrows
Shall NOT be allowed on this category of Local Street.

M. Sidewalk Width
1. Single-family residential: 5' wide combination w/curb.
2. Multi-family residential: 5' wide combination w/curb.
3. Suitable configurations with bike paths may be required. (See drawing No.'s 2,3 & 4).

N. Street Widths
1. Single-family residential: 32' paved width plus 2-2' gutter pans. (36' flowline-flowline).
2. Multi-family residential: 40' paved width plus 2-2' gutter pans. (44' flowline-flowline).

O. Minimum Radius of Curvature on Centerline (Horizontal). See Table 4.2.

P. Minimum Length of Vertical Curves.
See Table 4.6

Q. Street Grades.
A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles, and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0% (10% in mountainous terrain with special permission of the Director). See Table 4.1 and Table 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii. See Table 4.3.

4.2.2.3 LOCAL TYPE III

A. Posted Speed Limit-25 mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Less than 1,500 vehicles per day.

C. Limited Continuity.

D. Safety.
Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land.

E. Traffic Control.
Stop signs, yield signs, or right-of-way rules for uncontrolled intersections.

F. Function.
Local streets provide direct access to adjacent property. Traffic carried by local streets should have an origin or a destination within the neighborhood. Utility line easements should be available.

G. Right-Of-Way.
50 feet. An Appropriate radius for the R.O.W. will be provided at all intersections to ensure the sight distance triangle falls within the public R.O.W.

H. Number of Moving Lanes - Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristics.
Local streets should be designed to discourage through traffic from moving through the neighborhood. Local streets should not intersect major collectors or arterial streets. See Chapter 5 of these Regulations for intersection spacing criteria. This category of Local Street shall be for residential developments with a minimum lot size of 1 acre. Parking shall be restricted to one side of the street.

K. Type of Curb and Gutter.
Mountable type with attached sidewalk or curbwalk.

L. Cul-De-Sacs.
Shall all have a minimum flowline radius of forty-five (45) feet (see drawing No.'s 41, 42 & 43). Cul-de-sacs may have a maximum length of 1,200 feet, or a maximum of 40 dwelling units (whichever is most restrictive). Cul-de-sacs longer than 600 feet, or with more than 25 dwelling units, may require all units to be sprinkled per NFPA-13D.

M. Sidewalk Width.
1. Single-family residential: 5' wide combination w/curb.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 & 4).

N. Street Widths.
1. Single-family residential: 24' paved width plus 2-2' gutter pans. (28' flowline-flowline with parking restricted on one side.)

O. Minimum Radius of Curvature on Centerline (Horizontal). See Table 4.2.

P. Minimum Length of Vertical Curves.
See Table 4.6.

Q. Street Grades.
A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles, and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0% (10% in mountainous terrain with special permission of the Director). See Table 4.1 and Table 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.2.4 LOCAL TYPE IV (COMMERCIAL AND INDUSTRIAL)

A. Posted Speed Limit-25mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Less than 1,500 vehicles per day.

C. Limited Continuity.

D. Safety.
Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land. No on-street parking.

E. Traffic Control.
Stop signs, yield signs, or right-of-way rules for uncontrolled intersections.

F. Function.
Local streets provide direct access to adjacent property. Traffic carried by local streets should have an origin or a destination within the neighborhood. Utility line easements should be available.

G. Right-Of-Way.
60 feet. An appropriate radius for the R.O.W. will be provided at all intersections to ensure the sight distance triangle falls within the public R.O.W.

H. Number of Moving Lanes - Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristics.
Local streets should be designed to discourage through traffic from moving through the subdivision. Local streets should not intersect major collectors or arterial streets. See Chapter 5 of these Regulations for intersection spacing criteria. This category of Local Street shall be for commercial/industrial developments with a minimum lot width of 100 feet. No on-street parking, backing or loading maneuvers shall be allowed in the street.

K. Type of Curb and Gutter.
6" vertical curb and gutter.

L. Cul-De-Sacs.
Shall all have a minimum flowline radius of forty-five (45) feet (see drawing No.'s 41,42 & 43). Cul-de-sacs may have a maximum length of 1,200 feet, or a maximum of 40 lots (whichever is most restrictive). Cul-de-sacs longer than 600 feet, or with more than 25 lots, may require all units to be sprinkled per NFPA-13D.

M. Sidewalk Width.
1. 5' wide attached.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 & 4).

N. Street Widths.
38' paved width plus 2-2' gutter pans. (42' flowline-flowline).

O. Minimum Radius of Curvature on Centerline (Horizontal).
See Table 4.2.

P. Minimum Length of Vertical Curves.
See Table 4.6.

Q. Street Grades.
A Minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles, and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0% (10% in mountainous terrain with special permission of the Director). See Table 4.1 and Table 4.6 Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.3 COLLECTOR
A collector is a general term denoting a roadway designed or operating with the following characteristics:

4.2.3.1 Minor Collector

A. Posted Speed Limit-30mph.
Poster or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Less than 7000 vehicles per day.

C. Continuity.
Continuous for less than two miles.

D. Safety.
Designed to handle traffic volumes loading from and onto local, other collector, and arterial roadways.

E. Traffic Control.
Regulation of traffic accomplished through the use of stop signs and channelization. Traffic signals normally used only at intersections with major collectors and arterial streets. Parking is prohibited.

F. Function.
Collector streets collect and distribute traffic between arterial and local streets and serve as main connectors within communities, linking one neighborhood with another. Traffic carried by collector streets should have an origin or a destination within the community. Utility line easements should be available.

G. Right-Of-Way.
60 feet. An appropriate radius for the R.O.W. will be provided at all intersections to ensure the sight distance triangle falls within the public R.O.W.

H. Number of Moving Lanes. Two.

I. Access Conditions.
Intersections at grade with no direct access to abutting property permitted unless no other access is reasonably available.

J. Planning Characteristics.
Collector streets should have continuity throughout a neighborhood but need not extend beyond the neighborhood. See Chapter 5 of these Regulations for intersection spacing criteria.

K. Type of Curb and Gutter.
6" vertical curb and gutter.

L. Sidewalk Width.
1. 5' wide attached or detached.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. Street Widths.
34' paved width plus 2-2' gutter pans. (38' flowline-flowline). Additional lanes may be required at intersections.

N. Minimum Radius of Curvature on Centerline (Horizontal).
See Table 4.2.

O. Minimum Length of Vertical Curves.
See Table 4.6.

P. Minimum Length of Tangents Between All Curves.
50 feet.

Q. Street Grades.
A minimum longitudinal grade of 1.0% shall be required along the centerline of all Collector and Arterial streets. Maximum grade 6.0%. See Tables 4.1 and 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.3.2 MAJOR COLLECTOR

A major collector is a general term denoting a roadway designated or operating with the following characteristics:

A. Posted Speed Limit-35MPH.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Generally greater than 7000 vehicles per day when the property that the collector serves is fully developed.

C. Continuity.
Continuous for 2 or more miles.

D. Safety.
Designed to handle traffic volumes loading from and onto local, other collector and arterial roadways.

E. Traffic Control.
1. Regulation of traffic accomplished through the use of traffic signs, signals and channelization.
2. Parking is prohibited.
3. Traffic signals will normally be located only at intersections with streets of higher classification.

F. Function.
Major collector streets permit relatively unimpeded traffic movement and are intended for use on those where four (4) moving lanes are required but where a larger classified street is not warranted.

G. Right-Of-Way.
90 feet (min.). An appropriate radius for the R.O.W. will be provided at all intersections to ensure the sight distance triangle falls within the public R.O.W.

H. Number of Moving Lanes. Four.

I. Access Conditions.
1. Intersections at grade.
2. Access from street of lower classification will be permitted but in all cases will be controlled by traffic control devices.
3. Direct access to abutting property is not permitted unless no other access is

reasonably available.

J. Planning Characteristics.
1. Major collector streets should be employed where traffic demands dictate.
2. Landscaping elements are encouraged (Trees, open space, etc.).
3. Intersections with other collector and arterial streets should be at least one-quarter (1/4) mile apart. See Chapter 5 of these Regulations for intersection spacing criteria.

K. Type of Curb And Gutter.
6" vertical curb and gutter.

L. Sidewalk Width.
1. 8' wide detached. Sidewalk shall be detached a minimum of 5' from the back of curb.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. Street Widths.
4-14' travel lanes; 1-12' center turn lane; 2-2' gutter pans. (66' flowline-flowline).

N. Minimum Radius of Curvature On Centerline (Horizontal).
See Table 4.2.

O. Minimum Length of Vertical Curves.
See Table 4.6.

P. Minimum Length of Tangents Between All Curves.One hundred feet.

Q. Street Grades.
A minimum longitudinal grade of 1.0% shall be required along the centerline of all Collector and Arterial streets. Maximum grade 6.0%. See Tables 4.1 and 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.4 ARTERIAL

An arterial street is a general term denoting a roadway designated or operating with the following characteristics:

4.2.4.1 MINOR ARTERIAL

A. Posted Speed Limit.
Greater than or equal to 35 MPH. Actual posted speed to be determined by the Town Engineering Division prior to submittal of construction plans. Posted or prima facie speeds for the various street classification shall be 10 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Generally less than 12,000 vehicles per day when the property which the arterial serves is fully developed.

C. Continuity.
Continuous for several miles, generally connecting with inter-city routes.

D. Safety.
Designed to handle traffic volumes loading from and onto collector and arterial roadways.

E. Traffic Control.
1. Regulation of traffic accomplished through the use of traffic signs, signals and channelization.
2. Parking is prohibited.
3. Traffic signals will normally be required.

F. Function.
Arterial routes permit relatively unimpeded traffic movement and are intended for use on these routes where four moving lanes and one

left-turn lane are required but where a major arterial cross section would not be warranted.

G. Right-Of-Way.
100 Feet (min.). Additional R.O.W.may be required based on future transit needs as identified by the Planning Department.

H. Number of Moving Lanes.Four.

I. Access Conditions.
1. Intersections at grade.
2. Access from street of lower classification will be permitted but in all cases will be controlled by traffic control devices.
3. Direct access to abutting property is not permitted unless no other access is reasonably available.
4. Intersection spacing shall be 1/4 mile.

J. Planning Characteristics.
Arterials should be one half (1/2) to one (1) mile apart and should, where possible, be continuous. See Chapter 5 of these Regulations for intersection spacing criteria. Arterials should act as boundaries between neighborhood areas.

K. Type of Curb And Gutter.
6" vertical curb and gutter.

L. Sidewalk Width.
1. 8' wide detached. There must be a minimum distance of 5' from back of curb to the nearest edge of the sidewalk. This sidewalk is required to be 6" thick.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. Street Widths.
4-12' travel lanes (min.); 1-12' left turn

lane/striped or raised median, as may be required to control access; 2-2' gutter pans plus acceleration/deceleration lanes at intersections and a minimum of a 4' median. (68'-92' flowline-flowline).

N. Minimum Radius of Curvature On Centerline (Horizontal).
See Table 4.2.

O. Minimum Length of Vertical Curves.
See Table 4.6.

P. Minimum Length of Tangents Between All Curves.
One hundred feet.

Q. Street Grades.
A minimum longitudinal grade of 1.0% shall be required along the centerline of all Collector and Arterial streets. Maximum grade 6.0%. See Tables 4.1 and 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.4.2 MAJOR ARTERIAL (4 LANE)

A. Posted Speed Limit.
Greater than or equal to 35MPH. Actual posted speed to be determined by the Town Engineering Division prior to submittal of construction plans. Posted or prima facie speeds for the various street classifications shall be 10 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Generally greater than 12,000 vehicles per day when the property that the arterial serves is fully developed.

C. Continuity.
Continuous for several miles, generally connecting with inter-county and intra-county routes.

D. Safety.
Major arterial streets permit rapid and relatively unimpeded traffic movement throughout the Town, connecting major land use elements as well as communities with one another. Designed to handle traffic volumes loading from and onto collector, and arterial roadways.

E. Traffic Control.
1. Regulation of traffic accomplished through the use of traffic signals and channelization.
2. Parking shall be prohibited.
3. Roadways should have a median strip between them.

F. Function.
Major arterial routes permit rapid and relatively unimpeded traffic movement throughout the county, connecting major land use elements as well as communities with one another.

G. Right-Of-Way.
132 feet (min.). Additional R.O.W. may be required based on future transit needs as identified by the Planning Department.

H. Number of Moving Lanes.Four.

I. Access Conditions.
1. Intersections at grade.
2. Intersections will normally be located at 1/4 mile intervals.
3. Access from collector and arterial streets shall be controlled by traffic control devices.

4. Normally, direct access to abutting property is not permitted.
5. Abutting properties should not face on the roadway unless separated from it by a frontage road.

J. **Planning Characteristics.**
Major Arterials should be spaced approximately one(1) mile apart and should traverse an entire city and/or county. See Chapter 5 of these Regulations for intersection spacing criteria. Major arterial streets should not bisect neighborhoods but should act as boundaries between them.

K. **Type of Curb And Gutter.**
6" vertical curb and gutter.

L. **Sidewalk Width.**
1. 8' wide detached. There must be a minimum distance of 5' from back of curb to the nearest edge of the sidewalk. This sidewalk is required to be 6" thick.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. **Street Widths.**
4-12' travel lanes (min.); 4' to 26' medians, striped or raised median as may be required to control access; 2-1' median gutter pans plus necessary left turn and acceleration/deceleration lanes and 4' median at intersections plus 2-2' gutter pans. (82'-106' flowline-flowline).

N. **Minimum Radius of Curvature On Centerline (Horizontal).**
See Table 4.2.

O. **Minimum Length of Vertical Curves.**
See Table 4.6.

P. Minimum Length of Tangents Between All Curves. One hundred feet.

Q. Street Grades.
A minimum longitudinal grade of 1.0% shall be required along the centerline of all Collector and Arterial streets. Maximum grade 6.0%. See Tables 4.1 and 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
See Table 4.3.

4.2.4.3 MAJOR ARTERIAL (6 LANE)

A. Posted Speed Limit.
Greater than or equal to 35MPH. Actual posted speed to be determined by the Town Engineering Division prior to submittal of construction plans. Posted or prima facie speeds for the various street classifications shall be 10 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Generally greater than 12,000 vehicles per day when the property that the arterial serves is fully developed.

C. Continuity.
Continuous for several miles, generally connecting with inter-county and intra-county routes.

D. Safety.
Major arterial streets permit rapid and relatively unimpeded traffic movement throughout the county, connecting major land use elements as well as communities with one another. Designed to handle traffic volumes loading from and onto collector and arterial roadways.

E. Traffic Control.

1. Regulation of traffic accomplished through the use of traffic signals and channelization.
2. Parking shall be prohibited.
3. Roadways should have a median strip between them.

F. Function.

Major arterial routes permit rapid and relatively unimpeded traffic movement throughout the area, connecting major land use elements as well as communities with one another.

G. Right-Of-Way.

156 feet (mm). Additional R.O.W.may be required based on future transit needs as identified by the Town Planning Department.

H. Number of Moving Lanes. Six.

I. Access Conditions.

1. Intersections will generally be at grade.
2. Intersections will normally be located at 1/4 mile intervals.
3. Access from collector and arterial streets shall be controlled by traffic control devices.
4. Normally, direct access to abutting property is not permitted.
5. Abutting properties should not face on the roadway unless separated from it by a frontage road.

J. Planning Characteristics.

Major Arterials should be spaced approximately one (1) mile apart and should traverse an entire city and/or county. See Chapter 5 of these Regulations for intersection spacing criteria. Major arterial streets should not bisect neighborhoods but should act as boundaries between them.

G. Right-Of-Way. 50 feet.

H. Number of Moving Lanes. Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristics.
Local streets should be designed to discourage through traffic from moving through the neighborhood. Local streets should not intersect major collectors or arterial streets. See Chapter 5 for intersection spacing criteria. This category of Local Street shall be for residential developments with a minimum lot size of 0.5 acres (gross). No onstreet parking shall be allowed. Eight (8) parking spaces must be provided by each lot.

K. Type of Curb And Gutter.
Mountable type curb.

L. Cul-De-Sacs.
Shall all have a minimum pavement radius of thirty-eight (38) feet (see drawing No.'s 41, 42 and 43). Cul-de-sacs may have a maximum length of 1,200 feet, or a maximum of 40 dwelling units (whichever is most restrictive). Cul-de-sacs longer than 600 feet, or with more than 25 dwelling units, may require all units to be sprinkled per NFPA-13D.

M. Sidewalk Width.
1. None required.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

N. Street Widths.
Single-family residential; 24' paved width plus 2-4' gravel shoulders, parking restricted on both sides.

O. Minimum Radius of Curvature On Centerline (Horizontal). See Table 4.2.

P. Minimum Length of Vertical Curves. See Table 4.6.

Q. Street Grades.
A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0%. See Tables 4.1 and 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii. No curb returns, however, asphalt radius at intersections shall comply with Table 4.3.

4.2.5.2 RURAL LOCAL TYPE VI

A. Posted Speed Limit-25mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Less than 1,500 vehicles per day.

C. Limited Continuity.

C. Safety.
Designed for the safety of pedestrians and bicyclists, and the ease of access to adjacent parcels of land.

D. Traffic Control.
Stop signs, yield signs or right-of-way rules for uncontrolled intersections.

E. Function.
Local streets provide direct access to adjacent property. Traffic carried by local streets should have an origin or a destination within the neighborhood. Utility line easements should be provided.

G. Right-Of-Way. 60 feet.

H. Number of Moving Lanes. Two.

I. Access Conditions.
Intersections at grade with direct access to abutting property permitted.

J. Planning Characteristics.
Local streets should be designed to discourage through traffic from moving through the neighborhood. Local streets should not intersect major collectors or arterial streets. See Chapter 5 for intersection spacing criteria. This category of Local Street shall be for residential developments with a minimum lot size of 0.5 acres (gross). No onstreet parking shall be allowed. Eight (8) parking spaces must be provided by each lot.

K. Type of Curb And Gutter.
None. Minimum of 4' gravel shoulders.

L. Cul-De-Sacs.
Shall all have a minimum pavement radius of thirty-eight (38) feet (see drawing No.'s 41, 42 and 43). Cul-de-sacs may have a maximum length of 1,200 feet, or a maximum of 40 dwelling units (whichever is most restrictive). Cul-de-sacs longer than 600 feet, or with more than 25 dwelling units, may require all units to be sprinkled per NFPA-13D.

M. Sidewalk Width.
1. None required.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

N. Street Widths.
Single-family residential; 24' paved width plus 2-4' gravel shoulders, parking restricted on both sides.

O. Minimum Radius of Curvature On Centerline (Horizontal).
See Table 4.2.

P. Minimum Length of Vertical Curves.
See Table 4.6.

Q. Street Grades.
A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets except at curb returns, knuckles and bubbles where the minimum flowline grade shall be 2.0%. Maximum grade 6.0%. See Table 4.1 and Table 4.6. Also see section 5.4.2 (Inlets).

R. Curb Return Radii.
No curb returns, however, asphalt radius at intersections shall comply with Table 4.3.

4.2.5.3 RURAL LOCAL COLLECTOR

A. Posted Speed Limit-30 mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Less than 500 vehicles per day.

C. Continuity.
Continuous for less than two miles.

D. Safety.
Designed to handle traffic volumes loading from and onto local, other collector and arterial roadways.

E. Traffic Control.
Regulation of traffic accomplished through the use of stop signs and channelization. Parking is prohibited.

F. Function.
Collector streets collect and distribute traffic between arterial and local streets and serve as

main connectors within communities, linking one neighborhood with another. Traffic carried by collector streets should have an origin or a destination within the community. Utility line easements should be provided.

G. Right-Of-Way. 70 feet.

H. Number of Moving Lanes. Two.

I. Access Conditions.
Intersections or grade with direct access to abutting property not permitted unless no other access is reasonably available.

J. Planning Characteristics.
1. Collector street should have continuity throughout a neighborhood, but need not extend beyond the neighborhood.
2. See Chapter 5 for intersection spacing criteria.
3. Landscaping elements are encouraged (trees, open space, etc.).
4. This category of rural street shall be for residential developments with a minimum lot size of 0.5 acres (gross). No parking.
5. More lanes and R.O.W. may be required at intersections.

K. Type of Curb And Gutter.
Normally none.

L. Sidewalk Width.
1. None required.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. Street widths.
Thirty-two (32') foot width plus 4' gravel shoulders. Additional lanes may be required at intersections.

N. Minimum Radius of Curvature on Centerline (Horizontal).
See Table 4.2.

O. Minimum Length of Vertical Curves.
See Table 4.6.

P. Minimum Length of Tangents Between All Curves.
50 feet.

Q. Street Grades.
Minimum grade 1.0%. Maximum grade 6.0%. See Table 4.1 and Table 4.6.

R. Curb Return Radii.
See Table 4.3. If no curbs, pavement radii at street intersections with local and minor collectors shall be 25 feet and with major collectors and arterials shall be 30 feet.

4.2.5.4 RURAL MAJOR COLLECTOR

A major collector is a general term denoting a roadway designated or operating with the following characteristics:

A. Posted Speed Limit-35 mph.
Posted or prima facie speeds for the various street classifications shall be 5 miles per hour less than the design speed of that street.

B. Traffic Volumes.
Generally greater than 5,000 vehicles per day when the property which the collector serves is fully developed.

C. Continuity.
Continuous for two or more miles.

D. Safety.
Designed to handle traffic volumes loading from and onto local, other collector and arterial roadways.

E. Traffic Control.
   1. Regulation of traffic accomplished through the use of traffic signs, signals and channelization.
   2. Parking is prohibited.
   3. Traffic signals will normally be located only at intersections with streets of higher classification.

F. Function.
   Major collector streets permit relatively unimpeded traffic movement and are intended for use on those routes where two moving lanes and a center turn lane are required but where a larger classified street is not warranted.

G. Right-Of-Way.
   80 feet (min.).

H. Number of Moving Lanes. Two.

I. Access Conditions.
   1. Intersections at grade.
   2. Access from street of lower classification will be permitted but in all cases will be controlled by traffic control devices.
   3. Direct access to abutting property is not permitted unless no other access is reasonably available.

J. Planning Characteristics.
   1. Major collector streets should be employed where traffic demands dictate.
   2. Landscaping elements are encouraged (trees, open space, etc.).
   3. Intersections with other collector and arterial streets should be at least one-quarter (1/4) mile apart. See Chapter 5 for intersection spacing criteria.
   4. This category of rural street shall be for residential developments with a minimum lot size of 0.5 acres (gross). No parking.
   5. More lanes and R.O.W. may be required at intersections.

K. Type of Curb And Gutter.
Normally none; 4' paved plus 4' gravel shoulders.

L. Sidewalk Width.
1. None required.
2. Suitable configurations with bike paths may be required (see drawing No.'s 2,3 and 4).

M. Street Widths.
2-12' travel lanes; 1-12'center turn lane; 2-4' paved plus 2-4' gravel shoulders(44' total pavement width).

N. Minimum Radius of Curvature On Centerline (Horizontal).
See Table 4.2.

O. Minimum Length of Vertical Curves.
See Table 4.6.

P. Minimum Length of Tangents Between All Curves.
One hundred (100) feet.

Q. Street Grades.
Minimum grade 1.0%. Maximum grade 6.0%. See Table 4.1 and Table 4.6.

R. Curb Return Radii.
See Table 4.3. If no curbs, pavement radius shall comply with Table 4.3.

4.2.6 ROADWAY SPECIFICATION.
Table 4.1 shows a summary of the minimum roadway construction requirements and other related information.

4.3 SIDEWALKS, CURBS AND GUTTER, AND DRIVEWAYS

4.3.1 Roadway typical sections shall be as specified by these Roadway Standards. They are graphically summarized in the Appendix Section of these Regulations.

4.3.2 Sidewalks and bicycle paths, as per the con-

figurations of drawing No.'s 2,3 and 4, shall be required on all roadways unless specifically deleted by action of the Town Board.

4.3.3 All sidewalks shall have a minimum width of five (5) feet for local, commercial and collector streets. All sidewalks for arterials shall have a minimum width of 8' and be set back from the curb a minimum of 5'.

4.3.4 Combination curb, gutter and walk is approved for use on local roadways only. Vertical curb, gutter and detached walk shall be used on all other roadways, except minor collectors on which either attached or detached sidewalks are permitted.

4.3.5 State law requires that handicap ramps be installed at all intersections and at certain mid-block locations for all new construction or reconstruction of curb and sidewalk (CRS 43-2-107[2]). Handicap ramps shall be constructed in accordance with the Standard Details found in the Appendix Section of these Regulations. Handicap ramps shall be shown at all curb returns, and must be shown (located) at all "T" intersections directly opposite either curb return. Whenever referencing a handicap ramp, call out the specific Standard Detail to be used to construct that ramp. On local streets only, mid-block handicap ramps may be constructed per CDOT M-Standard M-608-1 "TYPE 3A-MID-BLOCK" (6' from flowline to back of ramp). See the pertaining Standard Details in the Appendix Section of these Regulations.

4.3.6 In general, when the number of parking spaces serviced by the driveway exceeds ten (10), radius returns are required. (See the pertaining chapter of these Regulations for Entrance Requirements).

4.3.7 Where curb cuts are allowed based on traffic considerations, concentrated storm water runoff must not be discharged across the sidewalk. These flows must be directed to a sidewalk chase section. If this is not possible due to grading restraints,

radius returns and a crosspan must be used.

4.3.8 Curb cuts and driveways shall be constructed in accordance with the Standard Details in the Appendix Section of these Regulations.

4.3.9 On all Town major collectors and arterials, wherever desirable, under-pass or over-pass (grade separated) pedestrian crossings will be provided for regional/neighborhood trails.

4.4 DRAINAGE

The minor and major storm drainage systems are designed in accordance with the Town's Drainage Criteria Manual. Because safe and efficient conveyance of traffic is the primary function of roadways, the storm drainage function of the roadway (such as allowable gutter capacity and street overtopping) will be designed to the limits set forth in this Drainage Criteria Manual. In the case of a conflict caused by requirements of the Urban Storm Drainage Criteria Manual, the stricter drainage requirements shall be adhered to.

4.4.1 CROSSPANS

Crosspans shall be constructed in accordance with the pertaining Standard Details in the Appendix Section of these Regulations. Crosspans are not permitted across entry streets, collector roadways, or arterial roadways.

On a case-by-case basis, if an excessive length of storm sewer must be constructed to comply with this requirement, causing undue financial hardship, a variance may be requested to use a 10-foot wide crosspan across a local street, an entry street, or a minor collector roadway. If there is storm sewer in the street, and within a reasonable distance, no crosspans shall be allowed.

No mid-block crosspans will be allowed.

4.4.2 INLETS

Inlets shall be located to intercept the curb flow at the point curb flow capacity is exceeded by the 10-

year runoff. Inlets shall also be installed to intercept cross-pavement flows at points of transition in superelevation. Inlets are not allowed in the curb return, but will be located at or behind the tangent points of the curb returns. Minimum inlet length for type "R" inlets shall be 5 feet.

4.4.3 CROSS SLOPE

Except at intersections, or where superelevation is required, roadways shall be level from top of curb to top of curb (or flowline to flowline) and shall have a two (2) percent crown. At or within the "L" distance shown in Figure 4.4, the maximum elevation difference between flowlines is that dictated by the allowable intersection grade (see Figure 4.4) and the actual distance between flowlines.

4.4.3.1 Parabolic or curved crowns are not allowed. In no case shall the pavement cross slope at warped intersections exceed the grade of the through street.

4.4.3.2 The rate of change in pavement cross slope, when warping side streets at intersections, shall not exceed one (1) percent every twenty-five (25) feet horizontally on a local roadway, one (1) percent every thirty-seven and one-half (37.5) feet horizontally on a collector roadway, or one (1) percent every fifty six and one-half (56.5) feet horizontally on arterial roadways. See Section 4.7 of this Chapter.

4.4.3 TEMPORARY EROSION CONTROL

Temporary erosion control is required along and at the ends of all roadways that are not completed due to project phasing, subdivision boundaries, etc., in accordance with the pertaining section of Bennett's Storm Drainage Criteria Manual.

4.4.4 SIDEWALK CHASES

Storm water from concentrated points of discharge shall not be allowed to flow over sidewalks, but shall drain to the roadway by use of chase sections.

Sidewalk chase sections shall not be located within the curb cut or driveway. Hydraulic design shall be in accordance with the Bennett Storm Drainage Criteria Manual. Sidewalk chases will only be allowed in special situations, on a case-by-case basis, as determined by the Engineer. Sidewalk chases, when permitted, are to be used to allow surface drainage to enter into the street gutter, rather than being used to avoid the use of a standard inlet.

Sidewalk chase sections are to be constructed in accordance with the Standard Details.

4.5 HORIZONTAL ALIGNMENT

Pavement widening required on local streets with r<400' per AASHTO Section III.

4.5.1 HORIZONTAL CURVES

TABLE 4.2
HORIZONTAL CURVES

DESIGN SPEED (MPH)	f	MAXIMUM CURVE (DEGREES)	MINIMUM CURVE RADIUS* (FEET)
25	0.245	32.7	200
30	0.215	22.9	325
35	0.190	14.3	500
40	0.174	10.4	700
45	0.162	8.0	1000
50**	0.152	6.7	1300
55**	0.146	5.7	1650

*Adapted from AASHTO Fig. 111-17

**Superelevation may be allowed. See Section 4.5.5 of this Chapter.

4.5.2 CURB RETURN RADII

Minimum and maximum curb return radii shall be shown in Table 4.3 below.

TABLE 4.3
CURB RETURN RADII
MINIMUM AND MAXIMUM
(Measured Along Flowline)

THROUGH STREET	ARTERIAL	COLLECTOR	LOCAL SERVICE
ARTERIAL	50' min	35' min	35'
COLLECTOR	35' min	30'	25'
LOCAL	35'	25'	20'

4.5.3 DESIGN SPEED

Horizontal alignment design speed shall be consistent with the requirement for vertical alignment design speed.

If no superelevation is required and a normal crown section exists, the horizontal curve data as shown in Table 4.2 shall be used.

4.5.4 BARRICADES

Whenever roadways terminate due to project phasing, subdivision boundaries, etc., barricades are required. Design and construction shall comply with the requirements of the Manual of Uniform Traffic Control Devices most recent edition. Details shall be shown on the construction drawings, and installation shall be provided by the Developer.

4.5.5 SUPERELEVATION

Superelevation may be required for curves on arterial roadways and selected collector roadways. Horizontal curve radii and superelevation shall be in accordance with the recommendations of the AASHTO "Green Book", (Horizontal Alignment).

Superelevation shall not be used on local or other roadway classifications with a design speed of 50 mph or less. Superelevation shall not be used without

prior approval by the Engineer.

4.5.5.1 DEFINITIONS REGARDING SUPERELEVATION

Superelevation Runoff - That length of roadway needed to accomplish the change in cross slope from a section with the adverse crown removed (flat) to the fully superelevated section, or vice versa.

Transition Points - Beginning or ending of tangent runout, superelevation runoff or full superelevation.

Tangent Runout - That length of roadway needed to accomplish the change in cross slope from a normal (2.0%) crown section to a section with the adverse crown removed (flat), or vice versa.

4.5.5.2 GENERAL

One of the most important factors to consider in highway safety is the centrifugal force generated when a vehicle traverses a curve. Centrifugal force increases as the velocity of the vehicle and/or the degree of curvature increases.

It is impossible to balance centrifugal force by superelevation alone, because for any given curve radius a certain superelevation rate is exactly correct for only one driving speed. At all other speeds there will be a side thrust either outward or inward, relative to the curve center, which must be offset by side friction.

4.5.5.3 STANDARDS FOR SUPERELEVATION

The Division "M" Standards (CDOT) on Super-elevation give the required rate of superelevation for the various degrees of curvature.

Maximum superelevation rates of 0.04 to 0.06 foot per foot are commonly used on major

streets. The lower value should be used where snow and ice are significant factors.

4.5.5.4 URBAN STREET CONDITIONS

Every effort should be made to maintain standard rates of superelevation. However, in urban areas, street intersections, established street grades, curbs and drainage conditions may require a reduction in the rate of superelevation, or different rates for each half of the roadbed. In warping areas for drainage, adverse superelevations should be avoided.

4.5.5.5 EFFECT OF GRADE

Drivers tend to travel somewhat faster in the downgrade than in the upgrade direction. This should be recognized in the designs for divided highways and ramps on steep grades.

Where practical, the designer should use a higher design speed for the downgrade and a lower design speed for the upgrade. The variation of design speed will depend upon the rate and length of grade and the degree of curvature compared with other curves on the highway section.

4.5.6 RAILROAD CROSSINGS

All railroad crossings on arterial streets shall be steel reinforced rubber for the full width of the roadway. A timber pedestrian walk and vehicle recovery area shall be provided on both sides of the steel reinforced rubber.

Timber crossings may be used in place of steel reinforced rubber on local streets only. Minimum crossing width shall be the full width of the right-of-way to provide for pedestrians and vehicle recovery area.

All railroad crossing must be approved by the affected railroad company.

4.5.7 CUL-DE-SACS

Criteria for cul-de-sacs shall follow the requirements of Section 4.2.

4.5.8 SIGHT DISTANCES

4.5.8.1 GENERAL

The major considerations in alignment design are safety, grade, profile, road area, design speed, sight distance, topography, drainage and performance of heavy-duty vehicles. Alignment should provide for safe and continuous operation at a uniform design speed. Road layout shall bear a logical relationship to existing or platted roads in adjacent properties.

4.5.8.2 HORIZONTAL ALIGNMENT

A. Sight Distance.

Horizontal alignment must provide at least the minimum stopping distance for the design speed at all points. This includes visibility at intersections as well as around curves and roadside encroachments.

B. Stopping Sight Distance.

The minimum stopping sight distance is the distance required by the driver of a vehicle traveling at the design speed to bring the vehicle to a stop after an object on the road becomes visible. Stopping sight distance is calculated in accordance with the AASHTO "Green Book", page 243. Object height is 6" above road surface and viewer's height is 3.50 feet above road surface.

Where an object off the pavement restricts sight distance, the minimum radius of curvature is determined by the stopping sight distance (see Figures 4.1a and 4.1b).

In no case shall the stopping sight distance be less than as specified in Table 4.4. A likely obstruction may be a bridge abutment or line of columns, wall, cut sideslope, or a side or corner of a building. The sight distance design procedure shall assume a 6'-0" fence (as measured from actual finished grade) exists at all property lines except in the sight distance triangles required at all intersections.

The lateral clearance, inner edge of pavement to sight obstruction, for various radii of inner edge of pavement and design speeds, is shown graphically in Figure 4.1. The position of the driver's eye and the object sighted are assumed to be 6 ft. from the inner edge of pavement, with the sight distance being measured along this arc.

TABLE 4.4
STOPPING AND PASSING SIGHT DISTANCE

DESIGN SPEED (MPH)	STOPPING SIGHT DISTANCE	PASSING SIGHT DISTANCE
15	100	500
20	125	800
25	150	1000
30	200	1100
35	250	1300
40	275	1500
45	325	1650
50	400	1800
55	450	1950

From AASHTO "Green Book"
Table III-1, Table III-5 and Table VII-3
(For Intersection & Driveway Sight-Distance, see Figure 4.2)

C. Passing Sight distance.
Passing sight distance is the minimum sight distance that must be available to

enable the driver of one vehicle to pass another safely and comfortably without interfering with oncoming traffic traveling at the design speed. Two-lane roads should provide adequate passing zones. Required passing sight distance for given design speeds is given in Table 4.4.

D. Coefficient of Friction.
The coefficient of friction (f) shall conform to the values shown in Table 4.5 for snowpacked conditions rather than as stated in Figure III-1 of the AASHTO "Green Book".

TABLE 4.5
COEFFICIENT OF FRICTION
(Design Criteria Snowpacked)

DESIGN SPEED	F
30-40	.24
40-50	.22
50-60	.21
60-70	.20

E. Intersection and Driveway Sight Distance (Sight Triangle).
There shall be an unobstructed sight distance along both approaches of both sides at an intersection within the R.O.W. for distances sufficient to allow the operators of vehicles, approaching simultaneously, to see each other in time to prevent collisions at the intersection. The sight triangle relationship developed for use in the Town is based upon the dimensions shown in Figure 4.2.

Any object within the sight triangle more than thirty-six (36) inches above the flowline elevation of the adjacent street shall constitute a sight obstruction, and shall be removed or lowered. Such objects

include: buildings, cut slopes, hedges, trees, bushes, utility cabinets or tall crops. This design criteria also requires the elimination of parking (except on local streets) within the sight triangle and applies whether the intersecting roads are level or on grades. The sight distance shall be measured to the centerline of the closest through lane in both directions.

All sight-distance triangles must be shown on the street plan/profile plans. All sight distances must be within the public right-of-way. In order to obtain the required sight distance within the right-of-way (R.O.W.), the R.O.W. cannot be widened more than 5.0 feet. On local residential streets only, if the L.O.S. (Line Of Sight) crosses the front yards of the lots, a "SIGHT DISTANCE EASEMENT" of no more than 5.0 feet may be dedicated on the plat to meet the required sight distance.

In no case shall any permanent object encroach into the line-of-sight of any part of the sight-distance triangle

4.5.9.3 VERTICAL ALIGNMENT

Both the horizontal and vertical sight distances should be checked to insure that the sight distance along the major highway is sufficient to allow a vehicle to cross or turn left, whichever is required

A. By determining graphically the sight distances on the plans and recording them at frequent intervals, the designer can appraise the overall layout and effect a more balanced design by minor adjustments in the plan or profile. Methods for scaling sight distances are demonstrated

in Figure 4.3. The Figure also shows a typical sight distance record that would be shown on the final plans.

Because the view of the highway ahead may change rapidly in a short distance, it is desirable to measure and record sight distance for both directions of travel at each station. Both horizontal and vertical sight distances should be measured and the shorter lengths recorded. In the case of two-lane streets, passing sight distance in addition to stopping sight distance should be measured and recorded.

Once the horizontal and vertical alignments are tentatively established, the practical means of examining sight distances along the proposed street is by direct scaling on the plans. (See Figure 4.3).

B. Horizontal sight distance on the inside of a curve is limited by obstructions such as buildings,hedges, wooded areas, high ground, or other topographical features. These generally are plotted on the plans. Horizontal sight is measured with a straightedge, as indicated at the upper left in Figure 4.3. The cut slope obstruction is shown on the worksheets by a line representing the proposed excavation slope at a point 2.0 feet (average of 3.50 and 0.5 feet) above the road surface for stopping sight distance and at a point about 3.75 feet above the road surface for passing sight distance. The position of this line with respect to the centerline may be scaled from the plotted roadway cross sections. The stopping sight distance should be measured between points on the one traffic lane, and passing sight

distance from the middle of one lane to the middle of the other lane as outlined in Figures 4.1a and 4.1b.

C. Vertical sight distance may be scaled from a plotted profile by the method illustrated at the right center of figure 4.3. A transparent strip with parallel edges 4.25 ft. apart and with scratched lines 6 in. and 3.50 ft. from the upper edge, in accordance with the vertical scale, is a useful tool. The 3.50 ft. line is placed on the station from which the vertical sight distance is desired, and the strip is pivoted about this point until the upper edge is tangent to the profile. The distance between the initial station and the station on the profile intersected by the 6 in. line is the stopping sight distance. The distance between the initial station and the station on the profile intersected by the lower edge of the strip is the passing sight distance.

D. A simple sight distance record is shown in the lower part of Figure 4.3. Sight distances in both directions are indicated by arrows and figures at each station on the plan and profile sheet of the proposed highway. To avoid the extra work of measuring unusually long sight distances that may occasionally be found, a selected maximum value may be recorded. In the example shown, all sight distances of more than 3,000 feet are recorded as 3,000+, and where this occurs for several consecutive stations, the intermediate values are omitted. Sight distances less than 1,000 feet may be scaled to the nearest 50 feet and those greater than 1,000 feet to the nearest 100 feet.

E. The methodology of graphically determining

sight distances may well require longer stopping sight distances than noted in Table 4.4 or Figure 4.1. However, in urban design, the combination of horizontal curves, vertical curves and intersections occurring at the same time is very real. The graphic solution then is a simple means to determine the controlling sight distances.

4.6 VERTICAL ALIGNMENT

Design controls for vertical alignment are shown on Table 4.6 below.

TABLE 4.6
VERTICAL ALIGNMENT CONTROLS

DESCRIPTION	DESIGN SPEED	MAX. GRADE	K-VALUE RANGES		MIN VCL	
			CREST	SAG	CREST	SAG
LOCAL TYPE I	25	6%(10%mtn)	25-30	25-30	50	50
LOCAL TYPE II	30	6%(10%mtn)	25-30	25-30	50	50
LOCAL TYPE III	30	6%(10%mtn)	25-30	25-30	50	50
COMMERCIAL/ INDUSTRIAL	30	6%(7%mtn)	35-50	35-50	50	50
LOCAL TYPE IV	30	6%(7%mtn)	25-35	25-35	50	50
RURAL LOCAL/ COLLECTOR	35	6%(7%mtn)	35-50	40-50	50	50
MINOR COLLECTOR	35	6%(7%mtn)	35-50	40-50	50	50
MAJOR COLLECTOR	40	6%(7%mtn)	55-65	55-65	50	50
MINOR ARTERIAL	45	6.0%	70-105	65-85	70	60
MAJOR ARTERIAL	45	6.0%	115-220	90-125	110	90

*The design speed is a minimum of five (5)mph over the posted arterials. Arterials are ten (10)mph over posted and design speeds are minimum for arterials.
**The maximum grades indicated should only be used in extreme topographic conditions, e.g., mountains. The designer should strive to minimize the use of these grades for considerable lengths and on north facing slopes.
***All vertical curves in knuckles and bubbles shall have a length of 50 feet.

4.6.1 Permissible Roadway Grades.

A minimum longitudinal flowline grade of 1.0% shall be required on all Local streets, except at curb returns, knuckles, bubbles and on rural local collectors where the minimum flowline grade shall be 2.0%.

A minimum longitudinal grade of 2.0% shall be required along the centerline of all Collector and Arterial streets.

The maximum allowable grade for any roadway is shown on Tables 4.1 and 4.6 of these Regulations.

4.6.2 Permissible Intersection Grades(Public Rights-of Way)

The maximum permissible grade at intersections will be as shown in figure 4.4. These grades are Maximum instantaneous flowline grades for the stated distances (each side of the street) for the minor (intersecting) street. Desirable intersection grades should be in the range of 2.0% to 4.0% for all intersecting streets with the limit of 3.0% for arterials.

Then, intersection grade of the major (through) street at the intersection may be dictated by design considerations for that street. However, if the major street intersection grade exceeds 3%, the type of access and access control will be dictated by the Town.

All private commercial driveways with curb return radii shall follow the standard set forth for a local street. The length of the maximum grade for the

commercial driveway shall be a minimum of 50 feet measured from the flowline intersection of the public roadway.

All vertical curves in knuckles and bubbles shall have a length of 50 feet.

4.6.3 **Changing Grades.**
The use of grade breaks in lieu of vertical curves is discouraged. However, if a grade break is necessary and the algebraic difference in grade (A) does not exceed one (0.01 ft./ft.) percent along the roadway, the grade break will permitted.

The maximum grade break allowed at the point of tangency at a curb return for local and collector roads shall be 2%, and for arterial roadways a maximum of 1%.

4.6.4 **Cross Fall.**
Except at intersections, or where superelevation is required, roadways shall be level from top of curb to top of curb (or flowline to flowline). The distance from intersections with which "cross-fall" will be permitted shall be determined by criteria in Section 4.4.3, Cross-Slope.

4.6.5 **Vertical Curves.**
When the algebraic difference in grade (A) is at or exceeds one (0.01 ft./ft.) percent, a vertical curve is to be used. Design criteria for vertical curves is found in Table 4.6 of these Regulations. Minimum length of a vertical curve is shown in Table 4.6.
All vertical curves shall be labeled, in the profile, with length of curve (L) and K (L/A) values and H.P. or L.P. elevations.

All vertical curves in knuckles and bubbles shall have a length of 50 feet.

4.7 INTERSECTIONS
The following criteria shall apply at intersections:

4.7.1.1 The grade of the "through" street shall take

precedence at intersections. At intersections of roadways with the same classification, the more important roadway, as determined by the Town Engineering Division, shall have this precedence. The design should warp side streets to match through streets with as short a transition as possible.

4.7.1.2 The key criteria for determining the elevation of the curb return on the side street and the amount of warp needed on a side street transitioning to a through street are:

A. Permissible grade in the stop/start lane. (See Section 4.6.2).

B. Pavement cross slope at the P.C.R.'s on the side street and permissible warp in pavement cross slope. (Section 4.4.3).

C. Normal vertical curve criteria. (See Section 4.6.5).

D. Vertical controls within the curb return itself. (See Section 4.7.3).

4.7.1.3 The elevation at the P.C.R. of the curb return on the through street is always set by the grade of the through street in conjunction with normal pavement cross slope (2.0%).

4.7.1.4 Carrying the crown at a side street into the through street is permitted only when drainage considerations warrant such a design. Refer to Section 4.4.3.2 for street cross slope allowances.

4.7.1.5 Dipping the flowline to the extent that the lip of gutter is dipped is not permitted. Dipping the flowline is only permitted as specified by Standard Details concerning curb opening inlets. Tipping an inlet for the benefit of drainage is also not permitted.

4.7.1.6 A more detailed review shall be performed for arterial-arterial intersections to maximize driveability. Few arterial intersections will have a uniform 2% cross slope, the majority of them having one or more sides warped. (See Sections 4.4.3 and 4.7.1.2 of this Chapter for rates of pavement warp allowed).

4.7.1.7 Whenever possible, intersections shall be made at right angles or radial to a curve. No intersecting angle of less than eighty (80) degrees will be allowed. (See Figure 4.5).

4.7.1.8 Intersection sight distances shall conform to the requirements of Section 4.5.9.2.e and Figure 4.2 of this Chapter which have been taken from Table V-11 (Page 468) and the formula on page 781 of AASHTO "Green Book".

4.7.2 CURB RETURNS

Minimum fall around curb returns along the flowline shall be as follows:

TABLE 4.7
CURB RETURNS

RADIUS	MINIMUM FALL
ALL	2.0% AROUND THE CURB RETURN

4.7.3 CURB RETURN PROFILES

Curb return profiles are required for radii equal to or greater than thirty (30) feet within the public right-of-way. A midpoint elevation along the arc length of the curb return shall be shown in plan view for radii equal to or greater than twenty-five (25) feet. Curb return design shall be set in accordance with the following design procedure. General standards for flowline control and profiles within the curb returns shall be as follows:

4.7.3.1 The point of tangency at each curb return shall be determined by the projected tangent grade beginning at the point of

intersection (P.I) of the flowlines.

4.7.3.2 The arc length and external distance of the curb return shall be computed and indicated on the drawing.

4.7.3.3 Show the corresponding flowline (or top of curb) grade for each roadway beyond the P.C.R.

4.7.3.4 Design the flowline of the curb return such that the maximum slope along the flowline does not exceed + 8%. Grade breaks at the P.C.R.'s will not exceed 2% for local and collector streets and 1% for arterials. Maximum vertical curves will equal the arc length of the curb return. The elevation and location of the high or low point within the return, if applicable, is to be called out in the profile. Warp of the side streets shall match across the street within the "L" distance shown on Figure 4.4. No more than 1' vertical difference in elevation across the street at the P.C.R. is allowed.

4.7.3.5 Scale for the curb return profile is 1"=10' horizontally and 1" - 1' vertically.

4.7.3.6 Curb return radii, existing and proposed, shall be shown.

4.7.4 CONNECTION WITH EXISTING ROADWAYS

4.7.4.1 Connection with existing roadways shall be smooth transitions conforming to normal vertical curve criteria (See Section 4.6) if the algebraic difference in grade (A) between the existing and proposed grade exceeds one (0.01ft./ft.) percent. When a vertical curve is used to make this transition, it shall be fully accomplished prior to the connection with the existing improvement, and also comply with the grade requirements at intersection approaches.

4.7.4.2 Existing grade shall be shown for at least three hundred (300) feet with field verified as-builts showing stations and elevations at twenty-five (25) foot intervals. In the case of connection with an existing intersection, these as-builts are to be shown within a three hundred (300) foot radius of the intersection. This information will be included in the plan and profile that shows that proposed roadway.

Limits and characteristics of the existing improvement are the primary concern in the plan view. Such characteristics include horizontal alignment, off-site intersections, limits of the improvement, etc.

4.7.4.3 Previously approved designs for the existing improvement are not an acceptable means of establishing existing grades, however, they are to be referenced on the construction plan, where they occur.

4.7.4.4 The basis of the as-built elevations shall be the same as the design elevations (both flowlines or both top of curbs, etc.) when possible. All elevations shall be based on USGS.

4.8 OFF-SITE DESIGN

The design grade, and existing ground at that design grade, of all roadways that dead end due to project phasing, subdivision boundaries, etc., shall be continued, in the same plan and profile as the proposed design, for at least five hundred (500) feet or to its intersection with an arterial roadway. This limit shall be extended to one thousand (1,000) feet when arterial roadways are being designed.

4.8.1 If the off-site roadway adjacent to the proposed development is not fully improved, the developer is responsible for the design and construction of a transition for the safe conveyance of traffic from

his improved section to the existing roadway. The following formula shall be applied to the taper of lane change necessary for this transition:

$$L=WS^2/60$$

where

L=Length of transition in feet
W=Width of offset in feet
S=Speed limit of 85th percentile speed.

4.8.2 The Town Engineering Division should be contacted to approve unusual transition criteria. This contact is the responsibility of the applicant.

4.9 ACCELERATION/DECELERATION LANES

The design of the arterial street system depends upon the proper control of access to developments. The location and design of access points must minimize traffic hazards and interference to through traffic movements. Acceleration/ Deceleration lanes shall be designed using Section 400 and 500 of the CDOT Road Design Manual. The need for acceleration or deceleration lanes shall be established by the approved traffic impact study for the final plat or final development plan.

4.10 BUS PULLOUT LANES

If recommended by the Regional Transportation District, bus pullout lanes shall be designed and constructed by the adjacent Developer.

4.10.1 The design of the pullout lanes will be governed by dimensions shown in Table 4.8 and shall be reviewed and approved according to procedures set forth in these Regulations.

TABLE 4.8
BUS PULLOUT LANES

SPEED LIMIT	LEAD-IN LENGTH	LEAD-OUT LENGTH
35 MPH & UNDER	60'	60'
40 MPH	100'	70'
45 MPH	150'	80'
50 MPH	200'	90'
55 MPH	250'	100'

4.10.2 The Pavement Design Soil Report as per the pertaining Chapter of these Regulations shall consider the requirements of the pullout lane separately from the adjacent roadway.

4.10.3 Bus pullouts shall be constructed with no less than 50 feet between an intersection curb return curve (P.C.) and the beginning of the lead-in taper.

4.11 CONSTRUCTION TRAFFIC CONTROL

4.11.1 PEDESTRIAN TRAFFIC

4.11.1.1 Every precaution shall be taken to ensure that construction work does not interfere with the movement of pedestrian traffic, which shall be maintained on the sidewalk at all times. Flagmen shall be provided for guidance as necessary.

4.11.1.2 Where an excavation interrupts the continuity of the sidewalk, the contractor shall provide suitable bridge or deck facilities, to be supplemented by the use of such proper devices and measures as prescribed in the Manual of Uniform Traffic Control Devices most recent edition, for the safe and uninterrupted movement of pedestrian traffic. The edges or ends of the pedestrian bridge or decking shall be beveled or chamfered to a thin edge to prevent tripping.

4.11.1.3 Temporary diversion walkways shall be hard surfaced and electric lighting shall be

provided and kept continuously burning during hours of darkness, when required by the Engineer.

4.11.1.4 Unless otherwise authorized by the Engineer, pedestrians shall not be channeled to walk on the traveled portion of a roadway.

4.11.1.5 Under certain conditions, it may be necessary to divert pedestrians to the sidewalk on the opposite side of the street. Such crossings shall only be made at intersections or marked pedestrian crossovers.

4.11.1.6 Facilities satisfactory to the Engineer shall be provided for pedestrians crossing at corners, pedestrian crossovers and public transportation stops.

4.11.2 VEHICULAR TRAFFIC

4.11.2.1 Construction work zone traffic shall be controlled by signs, barricades, detours, etc., which are designed and installed in accordance with the Manual of Uniform Traffic Control Devices most recent edition, and applicable Town Traffic Regulations. A Traffic control plan shall be submitted and accepted by the Engineer, or his designate, prior to start of any construction.

4.11.2.2 During construction of new facilities, traffic control should strive to keep the motorist from entering the facility. The primary means to accomplish this are by use of temporary barricades, located in advance of the point where new construction joins existing and by appropriate signing. New construction shall not be opened to traffic, and thus the construction traffic control removed, without the approval of the Engineering Division.

4.11.2.3 In general terms, a construction traffic control plan must be drawn on a map. The

traffic control plan should be super-imposed on as-builts, construction plan drawings or other detailed maps.

4.11.2.4 The Manual on Uniform Traffic Control Devices shall be the basis upon which the construction traffic control plan is designed, in concert with proper, prudent, and safe engineering practice. All necessary signing, striping, channelization devices, barricading, flagging, etc., shall be shown on the plan.

4.11.2.5 In concept, Town streets shall not be closed overnight, and work shall not force road or lane closures before 8:30 a.m. or after 3:30 p.m. If exceptions to this are required, this shall be so noted on the construction traffic control plan and must be specifically approved by the Engineer.

4.11.2.6 Directional access on roadways may be restricted (minimum travel lane width in construction area is 10 feet), but proper controls including flagging must be indicated. Removal of on-street parking should be considered, and noted where applicable.

4.12 MEDIAN ISLANDS

4.12.1 Median islands shall be designed per the AASHTO "Green Book". No permanent structures (trees, poles, large rocks, etc.) shall be placed within 10 feet of the traveled lane (unless median is constructed per the graphic examples in the Appendix Section of these Regulations) or in any location that would obstruct sight distance.

4.12.2 The nose of the median island shall not extend past the curb return at the intersection.

4.12.3 Landscaping on median island shall have a mature height of 24 inches or less above the traveled way in areas around intersections to facilitate adequate sight distance and will preferably be dry land or

native vegetation. If irrigation is planned for a median island, mitigation will be provided to protect the subgrade under the pavement from being saturated by using the median island detailed in drawing No. 28 in the Appendix Section of these Regulations.

4.12.4 A minimum flowline-flowline dimension of 24 feet must be maintained on both sides of all median islands.

4.12.5 When median islands are constructed/designed for concrete streets and the island is hardscape, the Developer shall install two thickness' of expansion material on each side of the median between the back of curb and "hardscape" and seal the expansion material.

4.12.6 Median islands 4' wide or less may not be landscaped and must be designed as stamped concrete or exposed aggregate concrete.

4.13 ENTRY STREETS

Only collectors or entry streets may connect residential neighborhoods to arterials. When collectors are not appropriate, entry streets shall be used and meet the following criteria:

4.13.1 Entry streets shall be a maximum of 200' in length and shall be one block in length.

4.13.2 No driveway access shall be allowed.

4.13.3 Entry streets shall be posted 25 MPH.

4.13.4 An "Entry Street" off of an arterial shall have a minimum 52' flowline-flowline dimension with the required 4' minimum median island, 24' min. FL-FL both sides.

4.13.5 An "Entry Street" off of a collector shall have a minimum 38' flowline-flowline dimension (if median island, 24' min. FL-FL both sides).

4.13.6 Entry streets shall be posted "No Parking".

4.13.7 An "Entry street" is considered a lower classification street than a collector, but greater than a local street, therefore, for example, "Entry Street" criteria for separation between intersections along a minor collector cannot be used to place a collector street within 160 feet of another intersection.

4.14 NUMBER OF DWELLING UNITS WITH A SINGLE ACCESS

The number of D.U.'s with a single access shall generally be as described under Sections 4.2.1.1, 4.2.1.3, & 4.2.3.4 of this Chapter. If an Entry Street is the single access to a group of homes, depending on the internal street alignments, up to 100 D.U.'s may be allowed with written approval of the Fire District. Factors that effect the allowable D.U.'s with a single access are: the length of the streets from a through collector or arterial; if, after entering the development, there is a circle drive so there is more than one way to get to a particular D.U., topography, vegetation (trees, scrub oak, etc.), and other considerations deemed important by the Fire Department for emergency access.

4.15 FIRE LANES

Any secondary access not constructed as part of the dedicated public street system shall meet the following design criteria in addition to the roadway design criteria within these Regulations. Fire lanes shall be required when safe access to structures within a Project is limited. The requirement for fire lanes shall be determined in the PRELIMINARY PLAT process by the Fire Department and/or Planning Department.

4.15.1 The slope of fire lanes shall be a minimum of 1% and a maximum of 8%. For mountainous terrain, the Director may allow for grades up to 12% with special circumstances.

4.15.2 The cross slope of the fire lanes shall be a minimum of 1% and a maximum of 4%.

4.15.3 The lane width shall be a minimum of 20 feet from Edge of Asphalt to Edge of Asphalt and shall be in an access easement. The lane widths may be required to

be increased through horizontal curves to accommodate fire truck passage.

4.15.4 There shall be a minimum of 18 feet of vertical clearance over the entire fire lane.

4.15.5 The fire lane may have a gate, but it must be approved as a "break away" by the Fire Department.

4.15.6 The surface of the roadway must be paved or approved otherwise by the Engineering Division. All pavement design shall meet the requirements of the Pavement Design Chapter of these Regulations.

BIKEWAYS/TRAILS

4.16 GENERAL

4.16.1 All projects shall optimize pedestrian and bicycle travel within the Town by providing bikeways, trails and pathways in all new developments in accordance with the Town's Master Plan.

4.16.2 Offsite improvements may also be required to provide residents with access to schools, and local commercial and community facilities. The bikeway and pathway system shall make use of, but not be limited to, the drainage and open space system.

4.16.3 Bicycle paths, lanes or routes, where required by applicable Town ordinances, approved site plans or development agreements, shall be shown on the approved construction plans and shall meet, at a minimum, these Regulations.

4.16.4 The materials used in the construction of bike paths and bikeways shall be in conformance to the Materials Chapter of these Regulations.

4.16.5 In locations where trails or bikeways cross private land or coincide with private access facilities, the Developer shall be required to provide a public access easement. This will ensure that trails and bikeways or other access facilities become part of

the overall Town bikeway/trails plan.

4.16.6 When Trails/Bikeways are to be constructed, maintenance and operation responsibility will be determined during the site/subdivision plan approval process. Public access/trail easements shall be conveyed to the Town. The easement width shall be clearly indicated on the site plan or construction plans.

4.16.7 No manholes or other appurtenances shall be located in bikeways or trails.

4.17 STANDARDS AND CRITERIA

In order to plan and construct bikeways and trails in a consistent, usable and orderly fashion, it is necessary to establish basic standards and criteria. The standards and criteria in this chapter and in the construction section shall be used in the design and review of Bikeways and Trails, development, site and subdivision plans.

4.17.1 BIKEWAY/TRAIL USE

A. Bikeway/Trail type, width and surface shall be approved by the Director after recommendations from staff. This recommendation will be based on site conditions and expected usage.

B. Generally, for trails an 8' minimum trail width is allowed. Bikeway widths shall have a minimum finished surface width of 8'. See drawing No.'s 35,36,37, 38,39 and 40 within the Appendix Section of this Manual.

4.17.2 BIKEWAY/TRAIL LOCATION

A. Bikeway/Trail location shall be based on safety, circulation and access considerations. Trails designated on the Town plan generally parallel to existing or proposed roadways shall be constructed wholly within the road right-of-way. These Bikeway/Trails shall be constructed in the general location designated as sidewalk on the typical road section. Examples of allowable typical

Walk/Bikeway configurations within Town right-of-ways are shown on drawings No.'s 2,3 and 4 within the Appendix Section of this Manual.

B. Where the typical road section does not include sufficient width to meet the minimum required Bikeway/Trail easements specified in the following table, the deduction of additional land adjacent to the street right-of-way will be necessary.

TABLE 4.9

TRAIL TYPE	MINIMUM REQUIRED EASEMENT WIDTH (FEET)
BIKEWAY (8')	20 FOOT MIN.
WALKWAYS (8')	20 FOOT MIN.
EQUESTRIAN/HIKING TRAILS (8')	20 FOOT MIN.

4.17.3 CLEARING

A. Where possible, trails and bikeways shall be located so as to minimize the loss of trees and disruption of natural environmental conditions. A minimum of 2' is required between the Bikeway/ Trail edge and any vertical obstructions such as trees, utility poles, signs or other obstacles.

B. Regardless of trail surface, all vegetative material within a clearing envelope of 10' wide shall be removed prior to trail construction. This requirement is to be verified by the Consultant Engineer and specified on the approved plans.

C. For trails greater than 8' width, a width of 4' greater than the width of trail shall be cleared.

D. All trails shall have a minimum of 10' clear vertical distance above the path. Equestrian trails shall have a minimum clearance of 12'. See detail No. 38 within the Appendix Section of these Regulations.

4.17.4 GRADE

A. A profile of the proposed trail construction shall be included in the construction plans or site plan. Typical cross sections shall be provided for all critical points along the length of the trail.

B. Minimum Allowable-A minimum grade of 1% is recommended except in sags where proper drainage is provided by cross slope.

C. Maximum Allowable-A maximum grade of 6% is recommended. However, staff will consider on a case by case basis grades up to 10%. At no time will short dips or excessively long grades be approved.

4.17.5 CROSS SLOPE

A. Minimum allowable-1/4" per foot of width (2.08% slope).

B. Maximum allowable-1/2" per foot of width (4.16% slope).

C. All design shall conform to the ADA requirements.

4.17.6 TURNING RADIUS

Minimum Allowable-Twenty feet (20') are recommended; however, the actual minimum allowable should be computed by the Consultant Engineer based on expected use and site conditions.

4.17.7 DRAINAGE

A. All trail designs shall be in accordance with the general storm drainage requirements of the Town's Drainage Criteria Manual.

B. Trails located within the State Right-Of-Way shall meet CDOT standards.

C. As a general guide, where a trail is cut into a hillside, a ditch shall be placed along the high side of the path to prevent sheet flow across the walkway.

D. Appropriate drainage improvements shall be provided along slopes exceeding 6%.

4.17.8 SAFETY CONSIDERATIONS

A. The safety of potential pedestrians, and others who may use or travel on a trail, shall be a prime consideration in the trail design.

B. A utility strip is required between the edge of the trail, and the back edge of curb and gutter. Two feet (2') is the minimum requirement. The actual separation should be a safety consideration by the Consultant Engineer, and shall be a consideration in the approval process. No trail shall be constructed directly adjacent to street curb or street pavement.

C. Trails which are to be located adjacent to roads with speed limits exceeding 25mph, and which have slopes greater than 6%, may require special safety measures such as the installation of barriers or other safety devices, or an increase in the distance between the trail and highway.

D. Standard signing and markings shall be included in the design and construction of the trail to alert trail users of potential hazards and to convey regulatory messages.

E. The Consultant Engineer shall address stopping and intersection sight distance at all trail intersections, curves and particularly where steep grades are proposed at trail/roadway intersections. Obstructions to the visibility of motorists or trail users shall be removed or the

trail aligned around the obstruction to maximize visibility.

F. Standard handicapped ramps will be provided at all trail curb crossings to allow continuity of trail use by bicyclists and the handicapped. For trails equal to or greater than 6' in width, curb depressions equaling the trail width shall be used, with the trail surface sloping to the pavement at 1' for every inch of curb height.

4.17.9 PEDESTRIAN BRIDGES

A. Pedestrian bridges shall be prefabricated using a standardized steel truss design with pressure treated timber decking.

B. Bridge Width-A minimum of 10'. Bridge widths 2' greater than the trail width are required for trails greater than 6' wide.

C. All trails require either a bridge or a fair weather crossing.

TABLE 4.1
ROADWAY CONSTRUCTION STANDARDS

DESIGN SPEED[1] (MPH)	LOCAL TYPE I	LOCAL TYPE II	LOCAL TYPE III	RURAL LOCAL TYPE IV
	25	30	30	30
DRIVNG LANES	2	2	2	2
MIN.R.O.W. (ft.)	50 Single-Family 60 Multi-Family	50 Single-Family 60 Multi-Family	50	60
ROADWAY WIDTH AND COMPOSITON OF CROSS-SECTION AT INTERSECTION	36' (SF) 32' paved width 2-2' gutter pans 44' (MF) 40' paved width 2-2' gutter pans	36' (SF) 32' paved width 2-2' gutter pans 44' (MF) 40' paved width 2-2' gutter pans	28' 2-12' travel lanes 2-2' gutter pans	24' paved width 2-4' gravel shoulders
ROADWAY WIDTH AND COMPOSITON OF CROSS-SECTION NOT AT INTERSECTION	36' (SF) 32' paved width 2-2' gutter pans 44' (MF) 40' paved width 2-2' gutter pans	36' (SF) 32' paved width 2-2' gutter pans 44' (MF) 40' paved width 2-2' gutter pans	28' 2-12' travel lanes 2-2' gutter pans	24' paved width 2-4' gravel shoulders
SIDEWALK, CURB, GUTTER	vert. or mountable with attached 5' sidewalk SF or 5' sidewalk MF	vert. or mountable with attached walk – 5'	Vertical c & g or Mountable curb with attached walk. 5'	NONE
CURB RETURN MIN. RADII -Intersect. art. -Intersect. coll. -Intersect. local	35 25 20	30 25 20	35 25 20	E.O.A. return same as in Table 4.3
MINIMUM RADIUS AT CURVE (ft.)* Per AASHTO Table III-15, Fig. III-17	200	325	325	325
MIN. TANGENT LENGTH BETWEEN REVERS CURVE (ft.)	25	25	25	25
MAXIMUM GRADE OF INTERSECTION -Intersect. Art. -Intersect. Coll. -Intersect. Local	See Figure 4.4			
MIN. – MAX. STREET GRADIENT	1.0 - 6.0% 10% in mountainous terrain[2]		1.0 – 6.0%	2.0 – 6.0% 10% in mountainous terrain[2]
VERTICAL ALIGNMENT CONTROL	See Figure 4.6			
MINIMUM PAVEMENT SECTION	Minimum Pavement Section 6"			

[1] Posted or prima facie speeds for the various street classifications are normally 5-10 miles per hour less than the design speed of that street.
[2] Mountainous terrain exists when the average cross slope of local terrain is at or above 15% with ridges and draws steep and well defined. (Limited)
[3] This is absolute minimum that would be allowed. Significantly greater curve radii are required for design of collector and arterial roadways to meet design steed criteria - See Table 4.2

TABLE4.1 (CONT.)
ROADWAY CONSTRUCTION STANDARDS

	COLLECTOR		
DESIGN SPEED[1] (MPH)	COMMERCIAL/MINOR	MAJOR	RURAL COLLECTOR
	35	40	35
DRIVING LANES	2	4	2
MIN. R.O.W. (ft.)	60	90	70
ROADWAY WIDTH AND COMPOSITON OF CROSS-SECTION AT INTERSECTION	42' 38' paved width 2-2' gutter pans Additional lanage may be required based on review of traffic impact study	64' 4-12' travel lanes 1-12' center turn lane 2-2' gutter pans	32' paved width 2-4' gravel shoulders
ROADWAY WIDTH AND COMPOSITON OF CROSS-SECTION NOT AT INTERSECTION	42' 38' paved width 2-2' gutter pans	64' 4-12' travel lanes 1-12' center turn lane 2-2' gutter pans	32' paved width 2-4' gravel shoulders
SIDEWALK, CURB, GUTTER	5' vertical 6" curb, gutter, detached walk.	vertical 6" curb, gutter, detached walk.	Normally no C&G, no sidewalk
CURB RETURN MIN. RADII -Intersect. art. -Intersect. coll. -Intersect. local	35 30 25		E.O.A. Return Same as in Table 4.3
MINIMUM RADIUS AT CURVE (ft.)* Per AASHTO Table III-15, Fig. III-17	See Table 4.2		
MIN. TANGENT LENGTH BETWEEN REVERS CURVE (ft.)	100		
MAXIMUM GRADE OF INTERSECTION -Intersect. Art. -Intersect. Coll. -Intersect. Local	See Figure 4.4		
MIN. – MAX. STREET GRADIENT	1.0 – 6.0% 7% in mountainous terrain[2]		
VERTICAL ALIGNMENT CONTROL	See Table 4.6		
MINIMUM PAVEMENT SECTION	Recommended Minimum Pavement Section 6"		

[1] Posted or prima facie speeds for the various street classifications are normally 5-10 miles per hour less than the design speed of that street.
[2] Mountainous terrain exists when the average cross slope of local terrain is at or above 15% with ridges and draws steep and well defined. (Limited)
[3] This is absolute minimum that would be allowed. Significantly greater curve radii are required for design of collector and arterial roadways to meet design steed criteria - See Table 4.2

TABLE 4.1 (CONT.)
ROADWAY CONSTRUCTION STANDARDS

	ARTERIAL		
	MINOR	MAJOR	
DESIGN SPEED[1] (MPH)	45 (min.)	45 (min.)	
DRIVING LANES	4	4	6
MIN. R.O.W. (ft.)	100	132	156
ROADWAY WIDTH AND COMPOSITION OF CROSS-SECTION AT INTERSECTION	90' 4-14' travel lanes 1-12' left turn lane 2-11' accel/decel lanes 2-2' gutter pans	106' 4-12' travel lanes 2-12' left turn lane 2-12' accel/decel lanes 2-2' gutter pans 2-1' median gutter pans 12' median (min.)	130' 6-12' travel lanes 2-12' left turn lane 2-12' accel/decel lanes 2-2' gutter pans 2-1' median gutter pans 12' median (min.)
ROADWAY WIDTH AND COMPOSITON OF CROSS-SECTION NOT AT INTERSECTION	66' 4-12' travel lanes 1-14' left turn lane striped median	80' 4-12' travel lanes 1-26' median 2-1' median gutter pans 2-2' gutter pans	106' 6-12' travel lanes 1-28' median 2-1' median gutter pans 2-2' gutter pans
SIDEWALK, CURB, GUTTER	vertical 6" curb and gutter with 8' minimum detached walk	vertical 6" curb and gutter with 5' minimum detached walk	
CURB RETURN MIN. RADII -Intersect. art. -Intersect. coll. -Intersect. local	See Table 4.3		
MINIMUM RADIUS AT CURVE (ft.)[2] Per AASHTO Table III-15, Fig. III-17	See Table 4.2		
MIN. TANGENT LENGTH BETWEEN REVERS CURVE (ft.)	100		
MAXIMUM GRADE OF INTERSECTION -Intersect. Art. -Intersect. Coll. -Intersect. Local	See Table 4.4		
MIN. - MAX. STREET GRADIENT	1.0 - 6.0%		
VERTICAL ALIGNMENT CONTROL	See Table 4.6		
MINIMUM PAVEMENT SECTION	recommended Minimum Pavement Section 6"		

[1] Posted or prima facie speeds for the various street classifications are normally 5-10 miles per hour less than the design speed of that street.
[2] Mountainous terrain exists when the average cross slope of local terrain is at or above 15% with ridges and draws steep and well defined. (Limited)
[3] This is absolute minimum that would be allowed. Significantly greater curve radii are required for design of collector and arterial roadways to meet design speed criteria - See Table 4.2

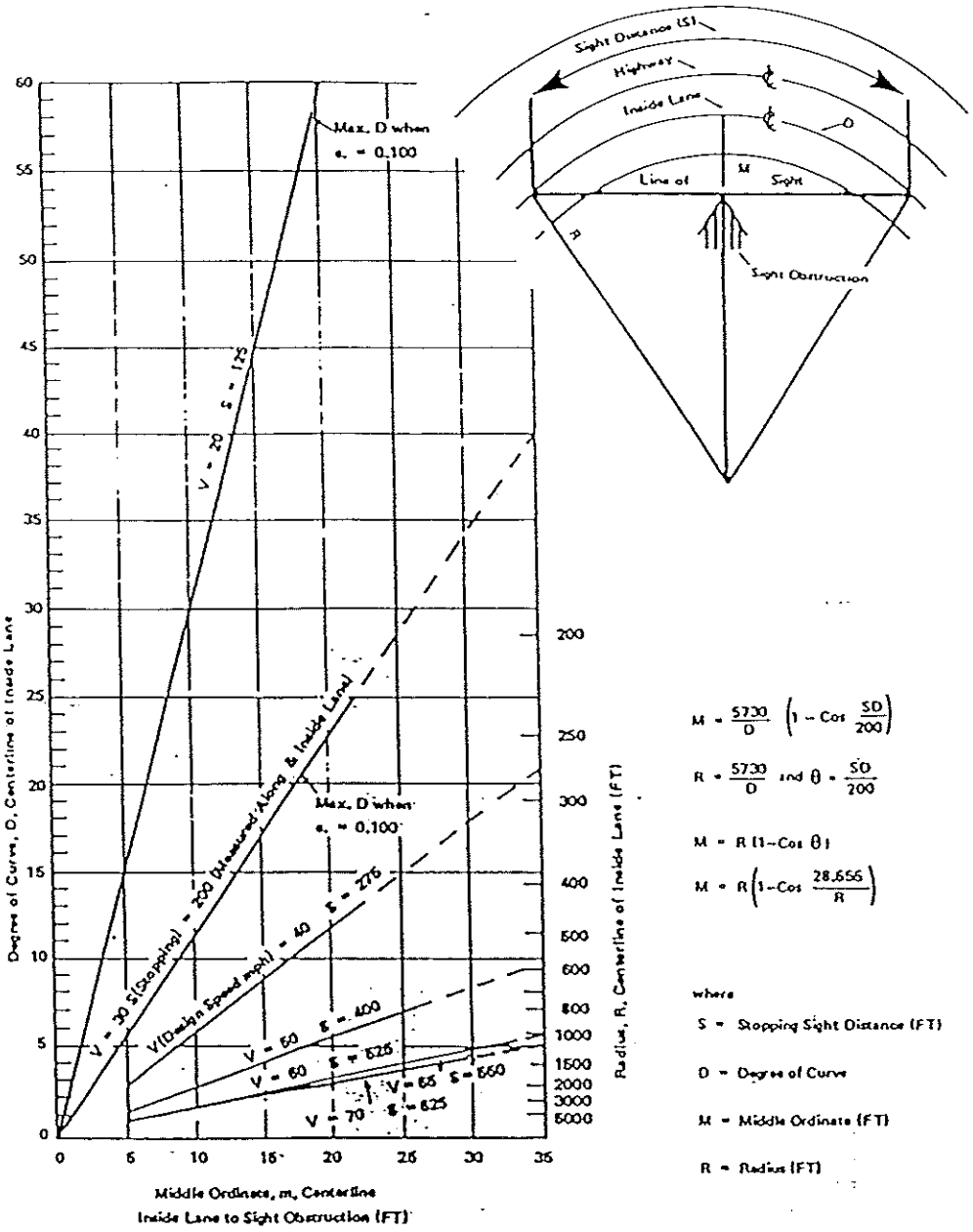


Figure III-25A. Range of lower values—relation between degree of curve and value of middle ordinate necessary to provide stopping sight distance on horizontal curves under open road conditions.

	LATERAL CLEARANCE TO SIGHT OBSTRUCTION INSIDE OF HORIZONTAL CURVES PROVIDING STOPPING DISTANCE FOR TURNING ROADWAYS	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIG 4.1a

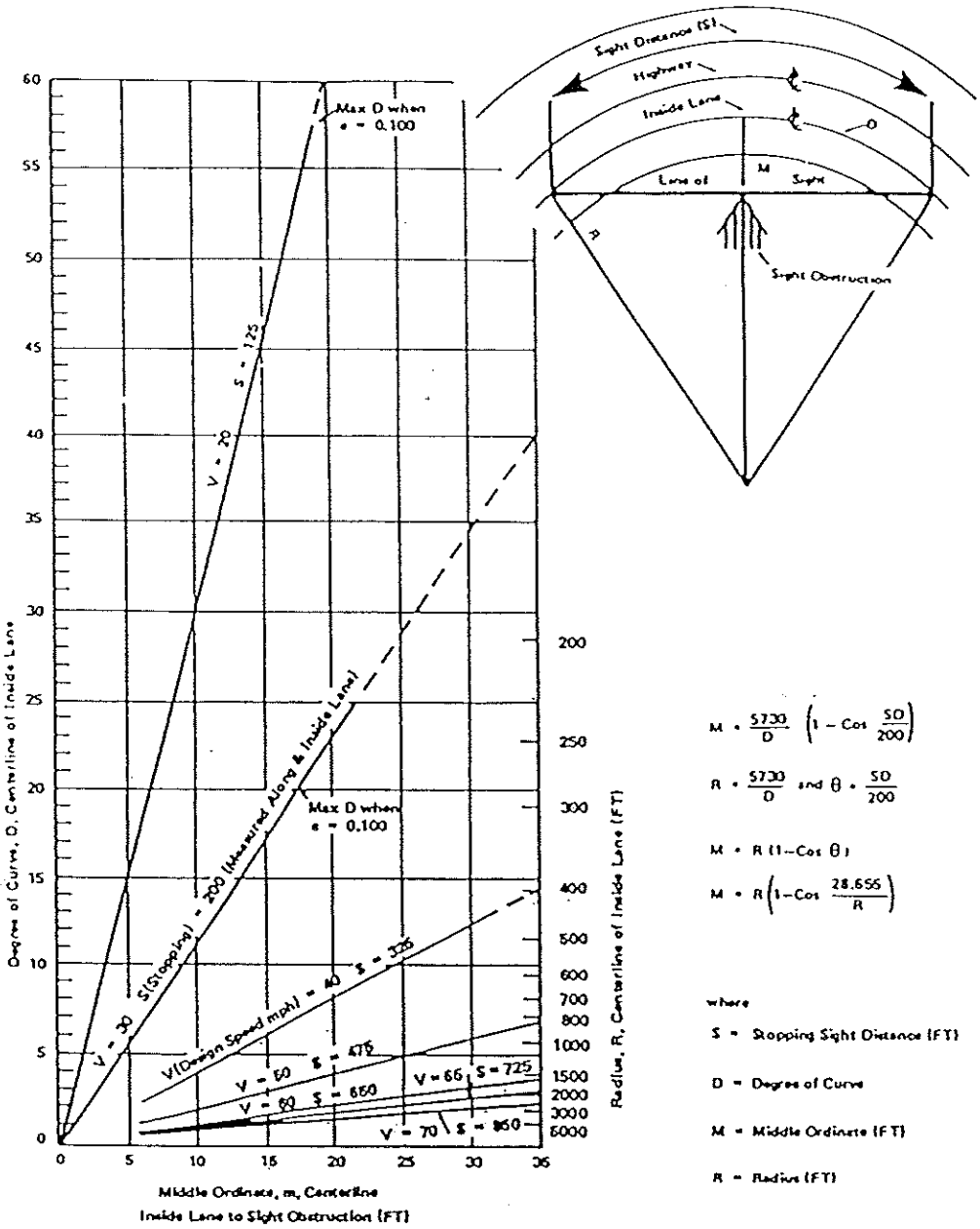
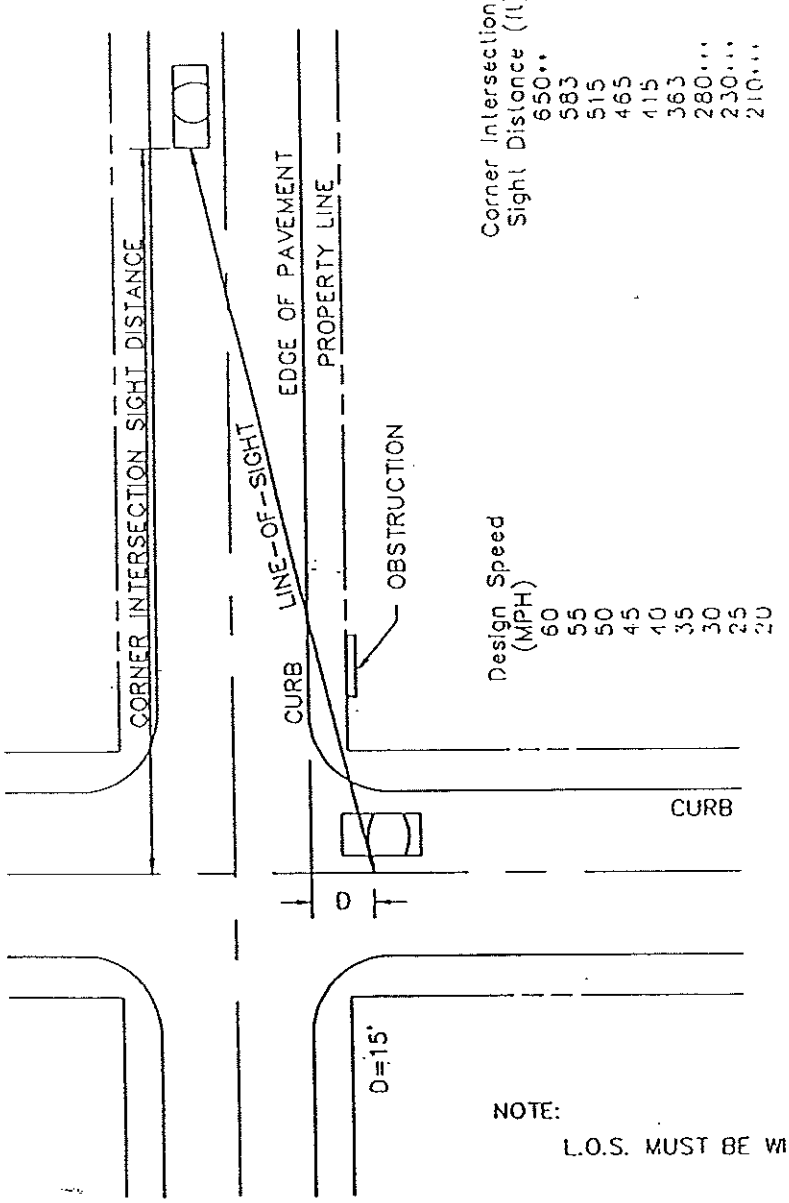


Figure III-25B. Range of upper values—relation between degree of curve and value of middle ordinate necessary to provide stopping sight distance on horizontal curves under open conditions.

	LATERAL CLEARANCE TO SIGHT OBSTRUCTION INSIDE OF HORIZONTAL CURVES PROVIDING STOPPING DISTANCE FOR TURNING ROADWAYS	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIG 4.1b

SIGHT DISTANCE AT INTERSECTIONS



Design Speed (MPH)	Corner Intersection Sight Distance (ft).*
60	650**
55	583
50	515
45	465
40	415
35	363
30	280***
25	230***
20	210***

* Corner sight distance measured from a point on the minor road at 15 feet back from the edge of the major road pavement (flowline) and measured from a height of eye at 3.50 feet on the minor road to a height of object at 4.25 feet on the major road.
**At 60 mph, stopping sight distance governs
***At Local-Local street intersections only, the "D" distance shall be ten feet (10') and the sight distance shall be measured to the centerline of the street.

NOTE:
L.O.S. MUST BE WITHIN R.O.W.

SIGHT DISTANCE DEVELOPED FROM AASHTO "GREEN BOOK"

	INTERSECTION SIGHT DISTANCE (SIGHT TRANGLE)	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIGURE 4.2

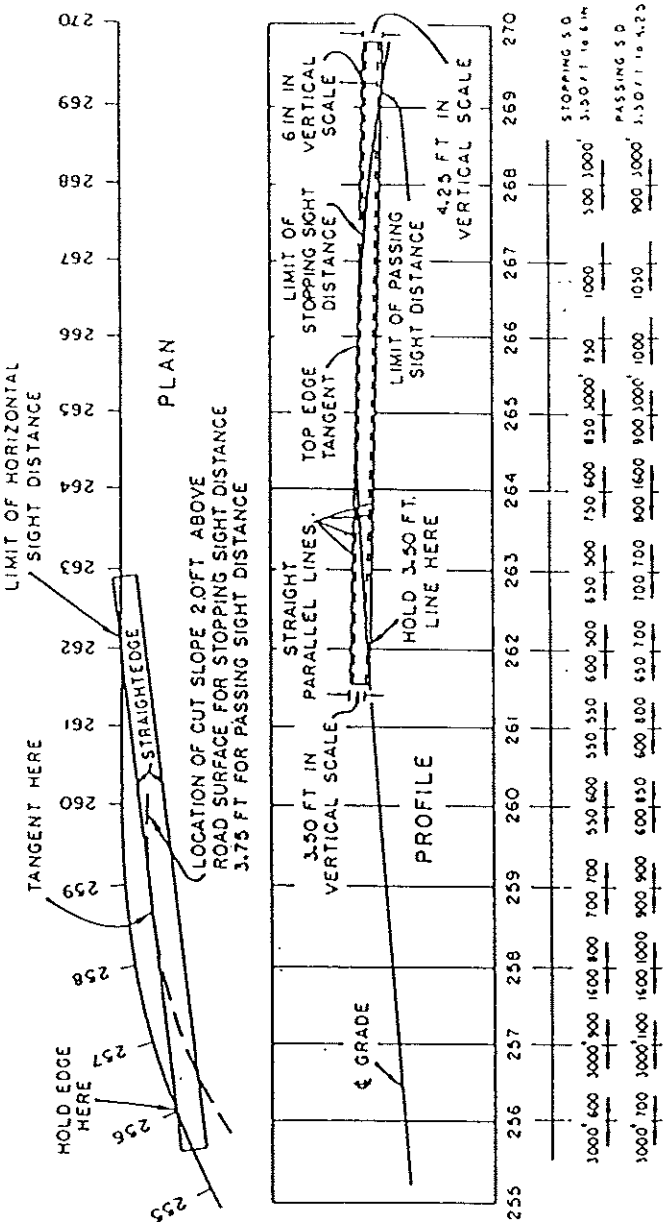
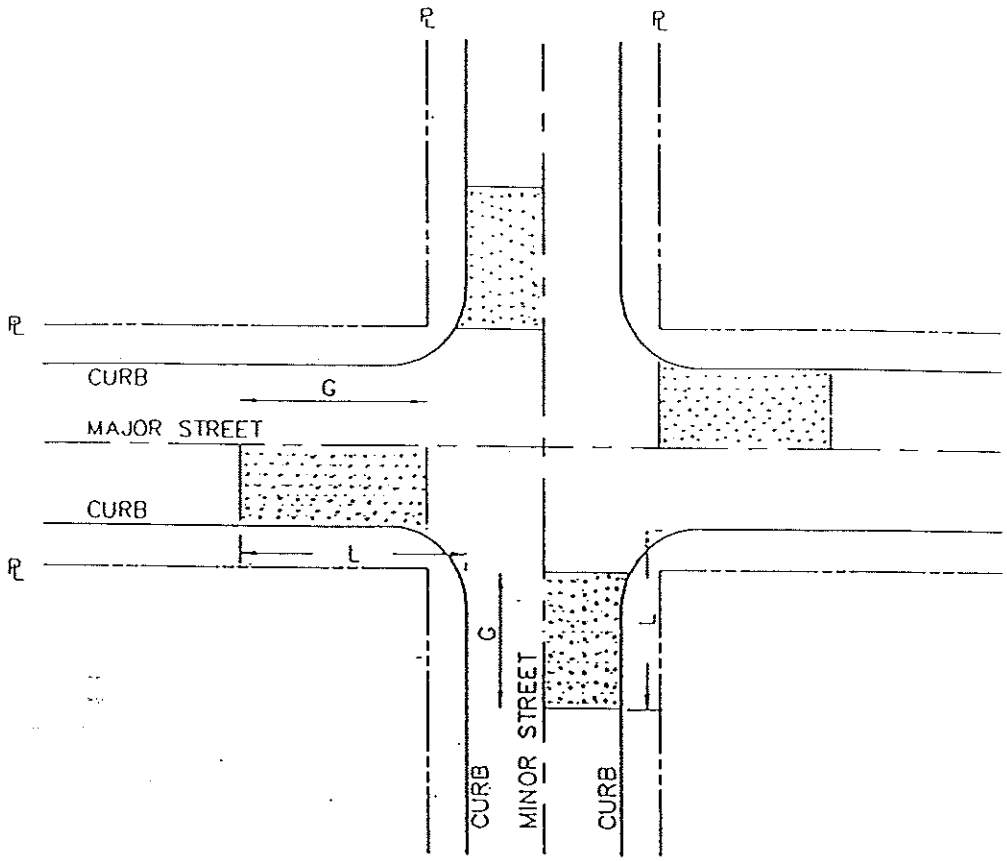


Figure III-3. Scaling and recording sight distances on plans.

	SCALING AND RECORDING SIGHT DISTANCES ON PLANS	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIGURE 4.3



* The longitudinal slope of the major street shall continue through the intersection and may be greater than the max "G" shown in the table except at major collectors and arterials.

MINOR STREET / MAJOR STREET	LOCAL	MINOR COLLECTOR	MAJOR COLLECTOR	MINOR ARTERIAL	MAJOR ARTERIAL
LOCAL	L.95' G 4%	100' 4%	100' 4%	125' 4%	125' 4%
MINOR COLLECTOR	L-- G--	100' 4%	120' 3%	150' 3%	150' 3%
MAJOR COLLECTOR	L-- G--	- -	120' 3%	150' * 3%	200' * 3%
MINOR ARTERIAL	L-- G--	- -	- -	200' * 2%	200' * 2%
MAJOR ARTERIAL	L-- G--	- -	- -	- -	200' * 2%

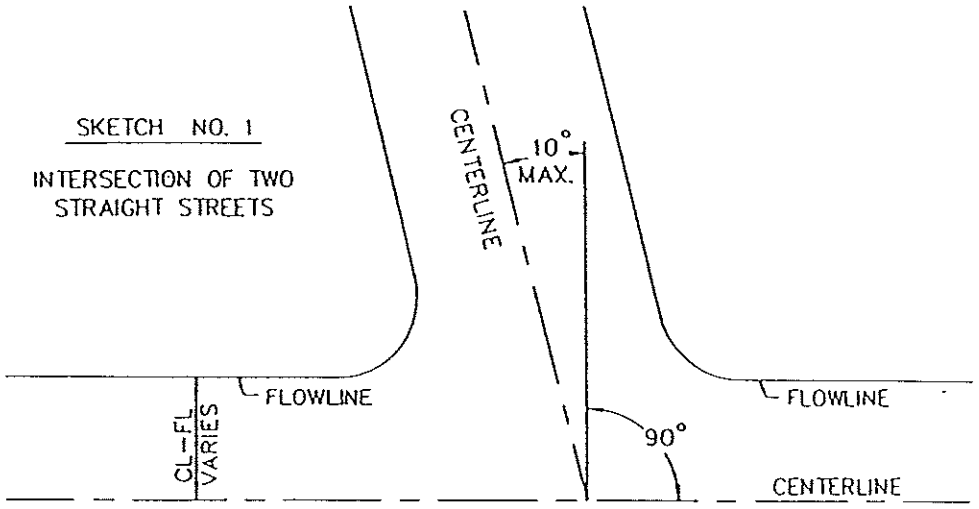
PERMISSIBLE INTERSECTION GRADES

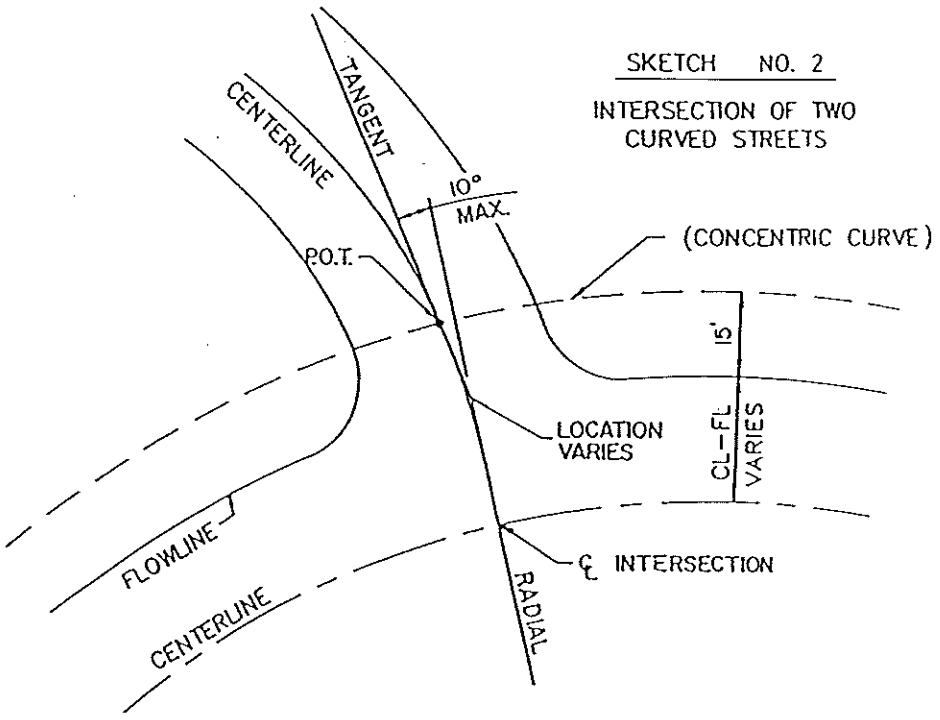
Town of Bennett

Issued: _____

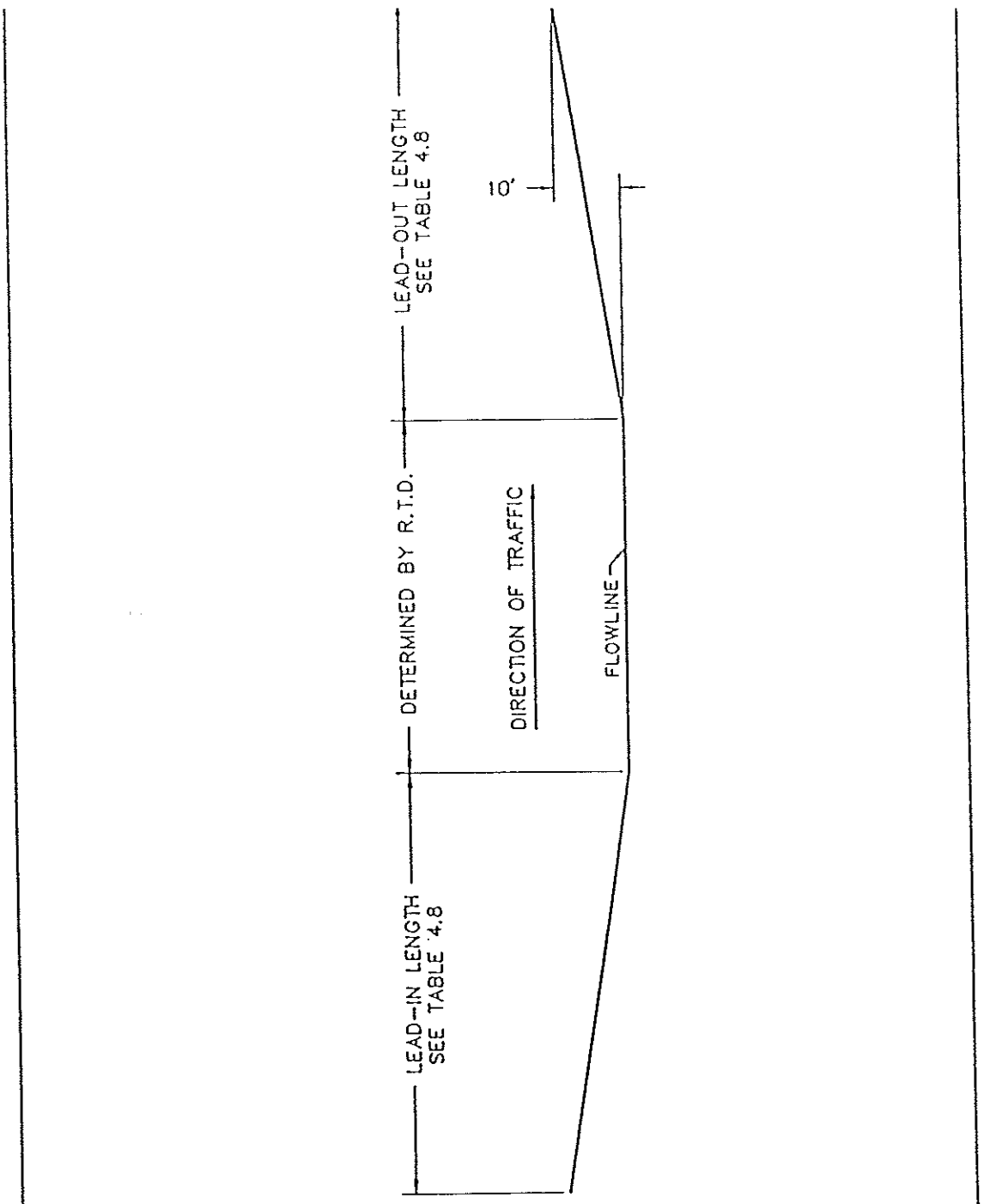
Revised: _____

Drawing No.
FIGURE 4.4





	PERMISSIBLE INTERSECTION ANGLES	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIGURE 4.5



	BUS TURNOUT STANDARD	Issued: _____ Revised: _____
	Town of Bennett	Drawing No. FIGURE 4.6